Test Bank to Accompany

Microeconomics

Seventh Edition

by

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Chapter 1 Preliminaries

1) Microeconomics is the branch of economics that deals with which of the following topics?
   A) The behavior of individual consumers
   B) Unemployment and interest rates
   C) The behavior of individual firms and investors
   D) B and C
   E) A and C

   Answer: E
   Diff: 1
   Section: 1.1

2) A Rolling Stones song goes: "You can't always get what you want." This echoes an important theme from microeconomics. Which of the following statements is the best example of this theme?
   A) Consumers must make the best purchasing decisions they can, given their limited incomes.
   B) Workers do not have as much leisure as they would like, given their wages and working conditions.
   C) Workers in planned economies, such as North Korea, do not have much choice over jobs.
   D) Firms in market economies have limited financial resources.

   Answer: A
   Diff: 1
   Section: 1.1

3) Economics is about the allocation of scarce resources. Which of the following is NOT an example of economic scarcity?
   A) If Steve goes to see the movie *Master and Commander* on Saturday, he will not be able to afford buying ice cream.
   B) If Jenny studies for her economics quiz this evening, she will not have time to walk her dog.
   C) If General Motors increases its production of SUVs this year, it will have to spend more on advertising.
   D) If Borders Books increases the number of titles it carries, it will have to reallocate shelf space to accommodate the new titles.

   Answer: C
   Diff: 2
   Section: 1.1

4) A valid and useful theory of gold prices:
   A) helps to predict the movements of gold prices over time.
   B) may be founded on simplifying assumptions.
   C) need not exactly predict every change in gold prices.
   D) all of the above
   E) none of the above

   Answer: D
   Diff: 1
   Section: 1.1

5) Use the following two statements to answer this question:
I. Economic theories are developed to explain observed phenomena by deducing from a set of basic rules and assumptions.
II. Economic theories use value judgments to determine which people ought to pay more taxes.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: B
Diff: 1
Section: 1.1

6) Which of the following is a positive statement?
A) The President of the United States ought to be elected by a direct vote of the American people rather than the Electoral College.
B) A fundamental assumption of the economic theory of consumer behavior is that consumers always prefer having more of any good to having less of it.
C) Because many adults cannot afford to go to college, tax credits for tuition should be introduced.
D) all of the above
E) none of the above

Answer: B
Diff: 1
Section: 1.1

7) Which of the following is a normative statement?
A) The taxes paid by the poor should be reduced in order to improve the income distribution in the U.S.
B) State governments should not subsidize corporations by training welfare recipients.
C) Presidential candidates should not be given funds from the federal government to run campaigns.
D) The sea otter should not be allowed to spread into Southern California coastal waters, because it will reduce the value of fisheries.
E) all of the above

Answer: E
Diff: 1
Section: 1.1

8) Which of the following is a positive statement?
A) Intermediate microeconomics should be required of all economics majors in order to build a solid foundation in economic theory.
B) The minimum wage should not be increased because this action would increase unemployment.
C) Smoking should be restricted on all airline flights.
D) All automobile passengers should be required to wear seatbelts in order to protect them against injury.
E) none of the above

Answer: E
Diff: 1
Section: 1.1

9) Which of the following is a positive statement?
A) When the price of a good goes up, consumers buy less of it.
B) When the price of a good goes up, firms produce more of it.
C) When the Federal government sells bonds, interest rates rise and private investment is reduced.
D) all of the above
E) none of the above

Answer: D
Diff: 1
Section: 1.1

10) Which of the following statements is false? An economic analysis of carbon taxes can:
A) calculate the increase in costs faced by coal–using industries.
B) predict the effect on unemployment in West Virginia coal mining communities.
C) compare the likely reductions in medical expenditures on diseases caused by smog.
D) present a trade–off of the costs and benefits of different levels of carbon taxes.
E) conclude that such taxes should be imposed to benefit future generations.

Answer: E
Diff: 1
Section: 1.1

11) Use the following two statements to answer this question:
I. In order to answer normative questions, it is necessary to make value judgments.
II. In order to conduct positive economic analysis, it is always necessary to use empirical evidence in addition to economic theories.
A) I and II are incorrect.
B) I is correct, II is incorrect.
C) I is incorrect, II is correct.
D) Both I and II are correct.

Answer: B
Diff: 1
Section: 1.1

12) _____ questions have to do with explanation and prediction, _____ questions have to do with what ought to be.
A) Positive; negative.
B) Negative; normative.
C) Affirmative; positive.
D) Positive; normative.
E) Econometric; theoretical.

Answer: D
Diff: 1
Section: 1.1

13) The key assumption underlying the theory of the firm is that:
A) firms are assumed to maximize sales revenue.
B) managers are assumed to maximize the number of employees in their department.
C) firms are assumed to maximize profits.
D) none of the above

Answer: C
Diff: 1
Section: 1.1

14) Which of the following statements is NOT true?
A) The trade–offs facing consumers and producers are based on prices.
B) All prices are determined by market interactions between buyers and sellers.
C) Prices serve an important role in microeconomics.
D) Only A and B above false.
E) Only B and C above are false.

Answer: B
Diff: 1
Section: 1.1

15) Please use the following statements to answer this question:
I. The process of testing and revising theories is central to the development of economics as a science.
II. Theory is imperfect and may not adequately describe economic behavior in some cases.
A) I and II are true.
B) I is true and II is false.
C) I is false and II is true.
D) I and II are false.

Answer: A
Diff: 1
Section: 1.1

16) The trade–offs facing consumers include:
A) how to allocate income across goods and serves.
B) how to allocate income between consumption and savings.
C) both A and B
D) none of the above

Answer: C
Diff: 1
Section: 1.1

17) The trade–offs facing workers include all of the following EXCEPT:
A) decision to work or remain outside the workforce.
B) decision to work or seek additional education.
C) decision to work for a large corporation or a small firm.
D) decision to allocate their time between work and leisure.
E) All of the above are trade–offs facing workers.

Answer: E
Diff: 1
Section: 1.1

18) Firms face trade–offs in production, including decisions related to:
A) which products to produce.
B) how much of a particular product to produce.
C) the best way to produce a given amount of output.
D) all of the above

Answer: D
Diff: 2
Section: 1.1

19) Which of the following markets has the most restrictive geographic boundary?
A) The market for retail gasoline
B) The market for housing
C) The market for gold
D) The market for beef

Answer: B
Diff: 1
Section: 1.2

20) An investor can acquire shares of stock in Acme Corporation either by purchasing shares on the stock market or by purchasing a bond that is convertible into shares of Acme stock. After careful study, the investor discovers that she can profit by purchasing the bond, converting it to shares of stock, and selling the stock. This practice is called:
A) selling short.
B) arbitrage.
C) profiteering.
D) dumping.
E) none of the above

Answer: B
Diff: 1
Section: 1.2

21) Use the following two statements to answer this question:
I. A market is a collection of buyers and sellers that, through actual or potential interactions, determine the price for a product or set of products.
II. An industry is a collection of markets for similar or closely related products.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: B
Diff: 1
Section: 1.2

22) In a perfectly competitive market:
A) there are a few buyers.
B) there is a single seller.
C) there is a cartel.
D) no single buyer or seller can significantly affect the market price.

Answer: D
Diff: 1
Section: 1.2

23) Boeing Corporation and Airbus Industries are the only two producers of long–range commercial aircraft. This market is not perfectly competitive because:
A) each company has annual sales over $10 billion.
B) each company can significantly affect prices.
C) Airbus receives subsidies from the European Union.
D) Airbus cannot sell aircraft to the United States government.
E) all of the above

Answer: B
Diff: 1
Section: 1.2

24) Which of the following are examples of perfectly competitive markets?
A) Wheat
B) Textiles
C) Gold
D) The stock market
E) all of the above

Answer: E
Diff: 1
Section: 1.2

25) Although the U. S. airline industry has only a relatively small number of sellers, the market is nevertheless highly competitive. The reason is that:
A) the number of buyers is very large.
B) due to fierce competition, no firm has significant control over prices.
C) due to fierce competition, no firm has significant control over the quantity supplied.
D) most airline routes are served by relatively many sellers.

Answer: B
Diff: 2
Section: 1.2

26) Washington D.C.'s metro train system is being extended further into the neighboring states of Maryland and Virginia, thereby reducing the cost of commuting into the United States' capital. Other things being held constant, this can be expected to:
A) decrease the extent of the market for housing around Washington D.C.
B) increase the extent of the market for housing around Washington D.C.
C) have no effect on the extent of the market for housing around Washington D.C. as the actual geography remains unchanged.
D) have no effect on the extent of the market for housing around Washington D.C. as the range of houses available has not changed.
E) have no effect on the extent of the market for housing around Washington D.C. as property taxes have not changed.

Answer: B
Diff: 2
Section: 1.2

27) Why is market definition important for economic decision making?
A) A firm is interested in knowing its actual and potential competitors.
B) A firm will define its market in order to maximize revenue.
C) Government regulators are interested in knowing the effect of mergers and acquisitions on competition and prices in a particular market.
D) both A and C
E) both A and B

Answer: D
Diff: 1
Section: 1.2

28) Which of the following features are relevant for determining the extent of a market?
A) Its geographical boundaries.
B) Technological innovations that would reduce the cost of production.
C) The range of products to be included in it.
D) both A and B
E) both A and C

Answer: E
Diff: 1
Section: 1.2

29) Which of the following statements about markets and industries is TRUE?
A) A market includes buyers but not sellers.
B) A market includes sellers but not buyers.
C) An industry includes buyers but not sellers.
D) An industry includes sellers but not buyers.

Answer: D
Diff: 1
Section: 1.2

30) Although there are many reasons why a market can be non–competitive, the principal economic difference between a competitive and a non–competitive market is:
A) the number of firms in the market.
B) the extent to which any firm can influence the price of the product.
C) the size of the firms in the market.
D) the annual sales made by the largest firms in the market.
E) the presence of government intervention.

Answer: B
Diff: 1
Section: 1.2

31) Which of the following could not possibly be included in the same market as Coke?
A) Pepsi B) Gatorade C) Milk D) Bread

Answer: D
Diff: 1
Section: 1.2

32) Use the following statements to answer this question:
I. Political candidates need to know the geographical extent of the market for TV commercials in determining how to reach the target number of eligible voters with the smallest possible expenditure.
II. The geographical extent of the market for gasoline in Texas will determine whether an oil company drills for oil there.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: B
Diff: 1
Section: 1.2

33) Which of the following assertions, if proven true in a court of law, would help Archer–Daniels–Midland, a maker of corn syrup, in its attempt to acquire another corn syrup producer, the Clinton Corn Processing Company?
A) Archer–Daniels–Midland is a dominant producer of corn syrup.
B) There are no good substitutes for corn syrup for any of its major uses.
C) Archer–Daniels–Midland and the Clinton Corn Processing Company together hold only a small share of the market for sweeteners including corn syrup and sugar.
D) Archer–Daniels–Midland produces many other different agricultural products, in addition to corn syrup.

Answer: C
Diff: 1
Section: 1.2

34) Use the following statements to answer this question:
I. If the extent of a market is broader, it is less likely that firms in the market can influence the market price.
II. In determining whether two different products belong to the same market, it is necessary to know whether the two products can be used as substitutes for each other.
A) I and II are both false.
B) I is false, and II is true.
C) I is true, and II is false.
D) I and II are both true.

Answer: D
Diff: 2
Section: 1.2

35) Use the following statements to answer this question:
I. The price for a given product may differ across sellers if the market is not perfectly competitive.
II. A single "market price" does not exist in imperfectly competitive markets.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: B
Diff: 2
Section: 1.2

36) Suppose you are in charge of product pricing and marketing strategy for a pharmaceutical company. You will have greater ability to independently set prices for your product if:
A) there are no close substitutes for your product.
B) there are lots of other firms selling closely related products in your market.
C) Your pricing policy should not depend on the number of close substitute products.
D) none of the above

Answer: A
Diff: 2
Section: 1.2

37) To arbitrage a price difference between two markets, you should:
A) sell in the low–price market and buy in the high–price market.
B) buy in the low–price market and sell in the high–price market.
C) sell in both markets to capture a lower average "market price."
D) none of the above

Answer: B
Diff: 2
Section: 1.2

38) Arbitraging price differences between two markets is generally not possible if:
A) there are positive costs of transporting the products from one market to the other.
B) the transportation costs are larger than the difference in prices.
C) the government has prohibited exchange between the two markets.
D) A and C above
E) B and C above

Answer: E
Diff: 2
Section: 1.2

39) Which of the following statement is FALSE?
A) Perfectly competitive markets are composed of many buyers and sellers.
B) Some markets may have only a few sellers but exhibit the properties of perfect competition.
C) A market may be composed of only one buyer and one seller.
D) All of the above statements are correct.

Answer: D
Diff: 2
Section: 1.2

40) The "constant dollar" price is:
A) the real price of a good.
B) the nominal price of a good adjusted for inflation.
C) the "current dollar" price adjusted for inflation.
D) all of the above
E) none of the above

Answer: D
Diff: 1
Section: 1.3

41) What does it mean when the CPI is higher this year than last?
A) The rate of inflation has increased.
B) There has been inflation since last year.
C) Real prices have increased.
D) Real prices have decreased.

Answer: B
Diff: 1
Section: 1.3

42) The price of a taco was $0.29 in 1970 and $0.99 in 1993. The CPI was 38.8 in 1970 and 144.0 in 1993. The 1993 price of a taco in 1970 dollars is:

A) $0.08. B) $0.27. C) $0.34. D) $3.67.

Answer: B
Diff: 2
Section: 1.3

43) Since last year, the price of gold has risen from $120 to $420. What annual inflation rate would leave the real price of gold unchanged over the last twelve months?

A) Approximately 29%
B) 40%
C) Approximately 71%
D) 250%
E) none of the above

Answer: D
Diff: 2
Section: 1.3

44) Over the past year price inflation has been 10%, but the price of a used Ford Escort has fallen from $6,000 to $5,000. The real price of a Ford Escort has fallen by:

A) 12%. B) 17% C) 20%. D) 24% E) 32%.

Answer: D
Diff: 2
Section: 1.3

45) Suppose the nominal price of gasoline was $0.90 per gallon in 1987. To convert this value to the real price of 1987 gasoline in 2008 dollars, we should:

A) multiply by the 1987 CPI and divide by the 2008 CPI.
B) multiply by the 2008 CPI and divide by the 1987 CPI.
C) not do anything because this is the real price in 2008 dollars.
D) none of the above

Answer: B
Diff: 1
Section: 1.3

46) The nominal price of industrial red paint was $12 per gallon in 1993. To convert this value to the real price of paint in 2008 dollars, we should use the:

A) Consumer Price Index. B) Producer Price Index
C) Fed funds rate. D) 30–day T–bill rate.

Answer: B
Diff: 1
Section: 1.3

47) Which of the following goods is NOT a likely component of the Consumer Price Index?

A) Hamburger B) 87 octane gasoline
C) Structural steel beams D) Movie tickets

Answer: C
Diff: 1
Section: 1.3

48) Which price index published by the US federal government represents wholesale price changes?
A) Consumer Price Index
B) Producer Price Index
C) GDP deflator
D) Dow–Jones Industrial Average

Answer: B
Diff: 1
Section: 1.3

49) When 1983 is the CPI base year, the CPI value is 82.4 for 1980 and 172.2 for 2000. Suppose we want to convert this CPI series to have a base year of 2000 (that is, $CPI_{2000} = 100$). What is the value of the revised CPI for 1980?
A) 172.2
B) 100
C) 47.9
D) 209.0

Answer: C
Diff: 1
Section: 1.3

50) Use the following statements to answer this question:
I. The inflation rate (the rate of change in the general price level) calculated from a price index like CPI is the same regardless of the base year we use to form the price index.
II. Although the CPI may indicate the general price level increased by 5% last year, there are some consumer products that may have experienced more or less inflation in the past year.
A) I and II are true.
B) I is true and II is false.
C) I is false and II is true.
D) I and II are false.

Answer: A
Diff: 1
Section: 1.3

51) Which price index published by the US federal government represents retail price changes?
A) Consumer Price Index
B) Producer Price Index
C) GDP deflator
D) Dow–Jones Industrial Average

Answer: A
Diff: 1
Section: 1.3

52) Which of the following is NOT an example of ways in which microeconomic analysis can help Ford Motor Company its in corporate decision making?
A) Forecasting demand for new automobiles
B) Determining how many automobiles to produce in order to maximize profits
C) Predicting how competitors will react to the firm's pricing strategy
D) Forecasting the effect of Ford's hiring patterns on the U.S. unemployment rate
E) Forecasting the effect of an oil price increase on demand for SUVs

Answer: D
Diff: 1
Section: 1.4

53) Which of the following is NOT an examples of ways in which microeconomic analysis can help in designing environmental policy?
A) Determining the optimal level of vehicle tailpipe emissions standards
B) Designing laws to provide incentives for firms to implement clean technologies in new vehicles
C) Lobbying consumers and firms to reduce consumption of energy
D) Examining the tradeoffs between ecological benefits of environmental legislation and its impacts on consumers' standard of living

Answer: C
Diff: 1
Section: 1.4

54) To evaluate the potential impact of changes to its SUV business, Ford Motor Company would use:
A) normative economic analysis.
B) positive economic analysis.
C) negative economic analysis.
D) arbitrage analysis.

Answer: B
Diff: 1
Section: 1.4

55) The Clean Air Act is designed to restrict automobile emissions and reduce the external costs of air pollution. The economic analysis used to develop the Clean Air Act was:
A) normative.
B) positive.
C) macroeconomic.
D) none of the above

Answer: A
Diff: 1
Section: 1.4

56) Suppose the Social Security Administration would like to guarantee the purchasing power of social security payments to the elderly does not diminish. That is, the real value of the payments does not decrease. The CPI in 1990 was 130.7 and the CPI in 1998 was 163.0. How much does the Social Security Administration need to increase payments from 1990 to 1998 to accomplish this objective?

Answer: The change in the general price level is 100(163–130.7)/130.7 = 25%. Thus, the level of payments in 1998 need to be P(1990)*(1+0.25).
Diff: 1
Section: 1.3

57) Suppose the minimum wage was $0.25 per hour in 1938 and the CPI in that year was 11.5. If the CPI in 1990 was 130.7, what is the real value of the 1938 minimum wage in terms of 1990 dollars? The real value of the 1990 minimum wage in terms of 1990 dollars is $4.25. Has the real value of the minimum wage declined since 1938?

Answer: W(1938) = 130.7($0.25)/11.5 = $2.84 , so the real value of the minimum wage has increased from 1938 to 1990.
Diff: 1
Section: 1.3

58) The reward for the capture of Jesse James was $500.00 in 1881. Suppose the CPI in 1881 was 0.25. What is the real value of the reward in 1990 dollars if the CPI was 130.7 in 1990?

Answer: 130.7($500)/0.25 = 130.7($2,000) = $261,400.
Diff: 1
Section: 1.3

59) The CPI in 1970 was 38.8 and in 1998 the CPI was 163.0. If the real value of a 1970 gallon of milk in terms of 1998 dollars is $0.70, what was the nominal price of milk in 1970?

Answer: 38.8($0.70)/163 = $0.17.
Diff: 2
Section: 1.3

60) The nominal price of milk was $2.25 in 1998 while the CPI was 163.0 that year. Also, the CPI in 1970 was 38.8. What was the real value of 1998 milk in terms of 1970 dollars?

Answer: 38.8($2.25)/163 = $0.54.
Diff: 2
Section: 1.3

61) The nominal price of a 1990 laptop was $3,500 and the CPI that year was 130.7. The nominal price of a laptop in 1998 was $1,600 and the CPI that year was 163.0. What is the real price of a 1998 laptop in terms of 1990 dollars? By what percent has the real price of laptops changed?

Answer: 130.7($1,600)/163 = $1,283. Percent decline in the real value of laptops:
–100($1,283 – $3,500)/$3,500 = $2,217(100)/$3,500 = 63.34%
Diff: 2
Section: 1.3

62) The price to attend a NBA basketball game in Chicago is $55 while the CPI in Chicago is 153. The CPI in Charlotte is 108 while the price to attend a NBA basketball game is $52. Which city offers a smaller real cost of attending a NBA basketball game?

Answer: Chicago real value[NBA(Charlotte)] = 153(52)/108 = $73.67. The real value of a game in Charlotte exceeds the real value of a game in Chicago. Chicago offers a smaller real cost of attending a game.
Diff: 2
Section: 1.3

63) The first column of the following table describes the price movement of AOL Corporation stock over the last 5 years. The second column gives the period's consumer price index. Calculate the real value of the stock for each time period using year 5 as the base year. If you purchased $1,000 worth of AOL Corporation in year 1, what has happened to the purchasing power of your original $1,000 investment when you sell the stock in year 5?

Year	AOL	CPI
1996	$4.00	147.8
1997	$3.84	155.3
1998	$7.00	163.0
1999	$37.00	165.4
2000	$70.00	172.1

Answer:

Year	Real AOL Stock Price in 2000 Dollars
1996	$4.66
1997	$4.26
1998	$7.39
1999	$38.50
2000	$70.00

The real value of a year 1996 dollar in 2000 is 172.1($1)/147.8 = $1.16. I would have bought 250 shares of AOL at 1996 prices (ignoring transaction costs) with the $1,000. The value of the stock in the year 2000 is (250($70)) = $17,500. The change in my purchasing power is ($17,500 – $1,160)/$1,160 = 14.09. That is, my purchasing power from investing in the stock rises by 1,409%.

Diff: 2
Section: 1.3

64) The following is a list of housing costs in five different countries along with their CPI. For which country is the real cost of housing declining? Use year 2 as the base year in your answer.

Country	Year			
	1		2	
	Housing Costs	CPI	Housing Costs	CPI
Argentina	37	121	32	97
Egypt	42	98	45	89
Italy	61	157	78	177
Spain	53	143	57	169
United States	25	100	33	103

Answer: The real cost of housing in Spain has decreased. The real cost of year 1 housing in year 2 is (169/143)53 = $62.64. This exceeds the real cost of year 2 housing in year 2, $57.00. Thus, housing costs have declined in Spain.

Diff: 1
Section: 1.3

65) For each city across the U.S., economists construct a price index for a similar basket of goods. In Los Angeles the index is 127.3 and the index for Dallas is 94.8. If you have been offered $137,000 for a job in Los Angeles and $117,000 for a similar job in Dallas, which job affords you the highest purchasing power of the bundle of goods in the price index? Use the Los Angeles value as the base.

Answer: Real value[Dallas] = 127.3($117,000)/94.8 = $157,111. This exceeds the real $137,000 salary for the job in Los Angeles. The Dallas job provides higher purchasing power.

Diff: 2
Section: 1.3

Chapter 2 The Basics of Supply and Demand

1) Which of the following is NOT an application of supply and demand analysis?
   A) Understanding changing world economic conditions and their effects on prices
   B) Evaluating the effects of government price controls on the agricultural industry
   C) Determining how taxes affect aggregate consumption spending patterns
   D) all of the above
   E) none of the above

   Answer: E
   Diff: 1
   Section: 2.1

2) A supply curve reveals:
   A) the quantity of output consumers are willing to purchase at each possible market price.
   B) the difference between quantity demanded and quantity supplied at each price.
   C) the maximum level of output an industry can produce, regardless of price.
   D) the quantity of output that producers are willing to produce and sell at each possible market price.

   Answer: D
   Diff: 1
   Section: 2.1

3) Plastic and steel are substitutes in the production of body panels for certain automobiles. If the price of plastic increases, with other things remaining the same, we would expect:
   A) the price of steel to fall.
   B) the demand curve for steel to shift to the right.
   C) the demand curve for plastic to shift to the left.
   D) nothing to happen to steel because it is only a substitute for plastic.
   E) the demand curve for steel to shift to the left.

   Answer: B
   Diff: 1
   Section: 2.1

4) Coffee and cream:
   A) are both luxury goods.
   B) are complements.
   C) are both more inelastic in demand in the long run than in the short run.
   D) have a positive cross price elasticity of demand.

   Answer: B
   Diff: 1
   Section: 2.1

5) Which of the following would shift the demand curve for new textbooks to the right?
A) A fall in the price of paper used in publishing texts
B) A fall in the price of equivalent used textbooks
C) An increase in the number of students attending college
D) A fall in the price of new textbooks.

Answer: C
Diff: 1
Section: 2.1

6) When an industry's raw material costs increase, other things remaining the same,
A) the supply curve shifts to the left.
B) the supply curve shifts to the right.
C) output increases regardless of the market price and the supply curve shifts upward.
D) output decreases and the market price also decreases.

Answer: A
Diff: 1
Section: 2.1

7) Sugar can be refined from sugar beets. When the price of those beets falls,
A) the demand curve for sugar would shift right.
B) the demand curve for sugar would shift left.
C) the supply curve for sugar would shift right.
D) the supply curve for sugar would shift left.

Answer: C
Diff: 1
Section: 2.1

8) Assume that steak and potatoes are complements. When the price of steak goes up, the demand curve for potatoes:
A) shifts to the left.
B) shifts to the right.
C) remains constant.
D) shifts to the right initially and then returns to its original position.

Answer: A
Diff: 1
Section: 2.1

9) Which of the following events will cause a leftward shift in the supply curve of gasoline?
A) A decrease in the price of gasoline
B) An increase in the wage rate of refinery workers
C) Decrease in the price of crude oil
D) An improvement in oil refining technology
E) all of the above

Answer: B
Diff: 1
Section: 2.1

10) Which of the following will NOT cause a shift in the supply of gasoline?
A) An increase in the wage rate of refinery workers
B) A decrease in the price of gasoline
C) An improvement in oil refining technology
D) A decrease in the price of crude oil

Answer: B
Diff: 1
Section: 2.1

11) Which of the following would cause a shift to the right of the supply curve for gasoline?
I. A large increase in the price of public transportation.
II. A large decrease in the price of automobiles.
III. A large reduction in the costs of producing gasoline.
A) I only B) II only C) III only D) II and III only

Answer: C
Diff: 2
Section: 2.1

12) You are analyzing the demand for good X. Which of the following will result in a shift to the right of the demand curve for X?
A) A decrease in the price of X
B) An increase in the price of a good that is a complement to good X
C) An increase in the price of a good that is a substitute for X
D) all of the above

Answer: C
Diff: 1
Section: 2.1

13) The price of good A goes up. As a result, the demand for good B shifts to the left. From this we can infer that:
A) good A is used to produce good B.
B) good B is used to produce good A.
C) goods A and B are substitutes.
D) goods A and B are complements.
E) none of the above

Answer: D
Diff: 2
Section: 2.1

14) Which of the following will cause the demand curve for Beatles' compact discs to shift to the right?
A) An increase in the price of the discs
B) A decrease in consumers' incomes
C) An increase in the price of Phil Collins' latest compact disc (a substitute)
D) all of the above
E) none of the above

Answer: C
Diff: 1
Section: 2.1

15) Which of the following will NOT cause a rightward shift in the demand curve for beer?
A) A change in the price of beer
B) A health study indicating positive health benefits of moderate beer consumption
C) An increase in the price of French wine (a substitute)
D) A decrease in the price of potato chips (a complement)
E) none of the above

Answer: A
Diff: 1
Section: 2.1

16) Which of the following would cause a rightward shift in the demand curve for gasoline?
I. A large increase in the price of public transportation.
II. A large decrease in the price of automobiles.
III. A large reduction in the costs of producing gasoline.
A) I only
B) II only
C) I and II only
D) II and III only
E) I, II, and III

Answer: C
Diff: 2
Section: 2.1

17) Suppose biochemists discover an enzyme that can double the amount of ethanol that may be derived from a given amount of biomass. Based on this technological development, we expect the:
A) supply curve for ethanol to shift leftward.
B) supply curve for ethanol to shift rightward.
C) demand curve for ethanol to shift leftward.
D) demand curve for ethanol to shift rightward.

Answer: B
Diff: 1
Section: 2.1

18) The discussion of Figure 2.2 in the text indicates that quantity demanded for most goods tends to increase as income rises. However, the quantity of bananas demanded in the U.S. tends to decrease as income rises. Under this condition, we expect that an increase in consumer income shifts the demand curve for bananas:
A) rightward B) no shift. C) leftward. D) downward.

Answer: C
Diff: 1
Section: 2.1

19) Due to the recent increase in the price of natural gas, the quantity of coal demanded by electric power generation plants has increased. Based on this information, coal and natural gas are:
A) complements. B) substitutes.
C) independent goods. D) none of the above

Answer: B
Diff: 1
Section: 2.1

20) To protect the cod fishery off the northeast coast of the U.S., the federal government may limit the amount of fish that each boat can catch in the fishery. The result of this public policy is to:
A) shift the cod demand curve to the left. B) shift the cod demand curve to the right.
C) shift the cod supply curve to the right. D) shift the cod supply curve to the left.

Answer: D
Diff: 1
Section: 2.1

21) When the current price is above the market-clearing level we would expect:
A) quantity demanded to exceed quantity supplied.
B) quantity supplied to exceed quantity demanded.
C) a shortage.
D) greater production to occur during the next period.

Answer: B
Diff: 1
Section: 2.2

22) Assume that the current market price is below the market clearing level. We would expect:
A) a surplus to accumulate.
B) downward pressure on the current market price.
C) upward pressure on the current market price.
D) lower production during the next time period.

Answer: C
Diff: 1
Section: 2.2

23) As long as the actual market price exceeds the equilibrium market price, there will be:
A) downward pressure on the market price.
B) upward pressure on the market price.
C) no purchases made.
D) Both A and C are correct.
E) Both B and C are correct.

Answer: A
Diff: 1
Section: 2.2

24) If the actual price were below the equilibrium price in the market for bread, a:
A) surplus would develop that cannot be eliminated over time.
B) shortage would develop, which market forces would eliminate over time.
C) surplus would develop, which market forces would eliminate over time.
D) shortage would develop, which market forces would tend to exacerbate.

Answer: B
Diff: 1
Section: 2.2

25) Suppose the quantity of nursing services demanded exceeds the quantity of nursing services supplied. The nursing wage rate will:

A) decrease. B) increase.
C) not change. D) none of the above

Answer: B
Diff: 1
Section: 2.2

Scenario 2.1:

The demand for books is: $Q_d = 120 - P$
The supply of books is: $Q_S = 5P$

26) Refer to Scenario 2.1. What is the equilibrium price of books?

A) 5
B) 10
C) 15
D) 20
E) none of the above

Answer: D
Diff: 1
Section: 2.2

27) Refer to Scenario 2.1. What is the equilibrium quantity of books sold?

A) 25
B) 50
C) 75
D) 100
E) none of the above

Answer: D
Diff: 1
Section: 2.2

28) Refer to Scenario 2.1. If P = $15, which of the following is true?

A) There is a surplus equal to 30.
B) There is a shortage equal to 30.
C) There is a surplus, but it is impossible to determine how large.
D) There is a shortage, but it is impossible to determine how large.

Answer: B
Diff: 2
Section: 2.2

29) Refer to Scenario 2.1. If P = $15, which of the following is true?

A) Quantity supplied is greater than quantity demanded.
B) Quantity supplied is less than quantity demanded.
C) Quantity supplied equals quantity demanded.
D) There is a surplus.

Answer: B
Diff: 1
Section: 2.2

30) Refer to Scenario 2.1. If P = $25, which of the following is true?
A) There is a surplus equal to 30.
B) There is a shortage equal to 30.
C) There is a shortage, but it is impossible to determine how large.
D) There is a surplus, but it is impossible to determine how large.

Answer: A
Diff: 2
Section: 2.2

31) Refer to Scenario 2.1. If P = $25, which of the following is true?
A) Quantity supplied is greater than quantity demanded.
B) Quantity supplied is less than quantity demanded.
C) Quantity supplied equals quantity demanded.
D) There is a shortage.

Answer: A
Diff: 1
Section: 2.2

32) Suppose the equilibrium price of milk is $3 per gallon but the federal government sets the market price at $4 per gallon. The market mechanism will force the milk price back down to $3 per gallon unless the government:
A) rations the excess demand for milk among consumers.
B) buys the excess supply of milk and removes it from the market.
C) Both A and B are plausible actions.
D) The government cannot maintain the price above the equilibrium level.

Answer: B
Diff: 2
Section: 2.2

33) The current market price for good X is below the equilibrium price, and then the demand curve for X shifts rightward. What is the likely outcome of the demand shift?
A) The surplus increases.
B) The surplus decreases.
C) The shortage increases.
D) The shortage decreases.

Answer: C
Diff: 1
Section: 2.2

34) Suppose there is currently a surplus of wheat on the world market. The problem of excess supply may be removed from the market by:
A) lowering the market price.
B) shifting the supply curve leftward.
C) shifting the demand curve leftward.
D) Both A and B are plausible actions.

Answer: D
Diff: 2
Section: 2.2

35) Which of the following would cause an *unambiguous* decrease in the real price of DVD players?
A) A shift to the right in the supply curve for DVD players and a shift to the right in the demand curve for DVD players.
B) A shift to the right in the supply curve for DVD players and a shift to the left in the demand curve for DVD players.
C) A shift to the left in the supply curve for DVD players and a shift to the right in the demand curve for DVD players.
D) A shift to the left in the supply curve for DVD players and a shift to the left in the demand curve for DVD players.

Answer: B
Diff: 2
Section: 2.3

36) From 1970 to 1993, the real price of a college education increased, and total enrollment increased. Which of the following *could* have caused this increase in price and enrollment?
A) A shift to the right in the supply curve for college education and a shift to the left in the demand curve for college education.
B) A shift to the left in the supply curve for college education and a shift to the right in the demand curve for college education.
C) A shift to the left in the supply curve for college education and a shift to the left in the demand curve for college education.
D) none of the above

Answer: B
Diff: 3
Section: 2.3

37) From 1970 to 1993, the real price of eggs decreased. Which of the following would cause an *unambiguous* decrease in the real price of eggs?
A) A shift to the right in the supply curve for eggs and a shift to the right in the demand curve for eggs.
B) A shift to the right in the supply curve for eggs and a shift to the left in the demand curve for eggs.
C) A shift to the left in the supply curve for eggs and a shift to the right in the demand curve for eggs.
D) A shift to the left in the supply curve for eggs and a shift to the left in the demand curve for eggs.

Answer: B
Diff: 2
Section: 2.3

38) From 1970 to 1993, the real price of eggs decreased and the total annual consumption of eggs decreased. Which of the following would cause an unambiguous decrease in the real price of eggs and an unambiguous decrease in the quantity of eggs consumed?
A) A shift to the right in the supply curve for eggs and a shift to the right in the demand curve for eggs.
B) A shift to the left in the supply curve for eggs and a shift to the right in the demand curve for eggs.
C) A shift to the left in the supply curve for eggs and a shift to the left in the demand curve for eggs.
D) none of the above

Answer: D
Diff: 3
Section: 2.3

39) We observe that both the price of and quantity sold of golf balls are rising over time. This is due to:
A) continual improvements in the technology used to produce golf balls.
B) increases in the price of golf clubs over time.
C) decreases in membership fees for country clubs with golf facilities.
D) more stringent professional requirements on the quality of golf balls requiring producers to use more expensive raw materials.

Answer: C
Diff: 3
Section: 2.3

40) Which of the following will cause the price of beer to rise?
A) A shift to the right in the demand curve for beer
B) A shift to the left in the supply curve of beer
C) both A and B
D) none of the above

Answer: C
Diff: 1
Section: 2.3

Scenario 2.2:

In 1992, the Occupational Safety and Health Authority passed the Bloodborne Pathogens Standard (BBP), which regulates dental office procedures. This regulation is designed to minimize the transmission of infectious disease from patient to dental worker. The effect of this regulation was both to increase the cost of providing dental care and to ease the fear of going to the dentist as the risk of contracting an infectious disease.

41) Refer to Scenario 2.2. What is the effect of the BBP on the market for dental care?
A) Only the supply curve shifts.
B) Only the demand curve shifts.
C) Both the demand and supply curves shift.
D) Neither the demand nor supply curve shifts.

Answer: C
Diff: 1
Section: 2.3

42) Refer to Scenario 2.2. What is the effect of the BBP on the market for dental care?
A) Both supply and demand shift to the right.
B) Both supply and demand shift to the left.
C) Supply shifts to the right, and demand shifts to the left.
D) Supply shifts to the left, and demand shifts to the right.
E) none of the above

Answer: D
Diff: 1
Section: 2.3

43) Refer to Scenario 2.2. What is the effect of the BBP on the equilibrium price of dental care?
A) It unambiguously increases.
B) It unambiguously decreases.
C) It increases only if supply shifts more than demand.
D) It increases only if demand shifts more than supply.

Answer: A
Diff: 2
Section: 2.3

44) Refer to Scenario 2.2. Under what circumstances will the equilibrium level of output of dental care remain the same?
A) If supply shifts more than demand.
B) If demand shifts more than supply.
C) If both demand and supply shift by the same magnitude.
D) If supply and demand shift in the same direction.

Answer: C
Diff: 2
Section: 2.3

45) Refer to Scenario 2.2. Under what circumstances will the equilibrium level of output of dental care increase?
A) If supply shifts more than demand.
B) If demand shifts more than supply.
C) If both demand and supply shift by the same magnitude.
D) If supply and demand both decrease.

Answer: B
Diff: 2
Section: 2.3

46) After the September 11, 2001 attacks on the World Trade Center, the supply of downtown office space in Manhattan was dramatically reduced. Forecasters predicted that the equilibrium price would rise, but in fact the price fell. What are some factors that could explain the fall in the equilibrium price, which the forecasters failed to take into account?
A) Demand for office space fell due to quality–of–life concerns.
B) The economic slowdown caused demand for office space to fall.
C) both A and B
D) none of the above

Answer: C
Diff: 1
Section: 2.3

47) The effect of the September 11 attacks on the World Trade Center on the market for office space in downtown Manhattan was that both the equilibrium price and the equilibrium quantity fell. What is the most likely explanation for this?
A) Supply and demand both shifted left, and the magnitude of the demand shift was greater.
B) Supply and demand both shifted left, and the magnitude of the supply shift was greater.
C) Supply shifted left, demand shifted right, and the magnitude of the demand shift was greater.
D) Supply shifted left, demand shifted right, and the magnitude of the supply shift was greater.

Answer: A
Diff: 2
Section: 2.3

48) Last year, the world demand curve for copper shifted rightward due to continued economic growth in China and other emerging economies. Also, the supply curve for copper shifted leftward due to strikes and other labor disruptions at some of the copper mines. As a result, we observed:
A) higher equilibrium copper prices and unambiguously lower quantities.
B) higher equilibrium copper prices and unambiguously higher quantities.
C) higher equilibrium copper prices and either higher or lower quantities.
D) lower equilibrium copper prices and either higher or lower quantities.

Answer: C
Diff: 2
Section: 2.3

49) Suppose the supply of textbooks is upward sloping and shifts leftward due to higher ink and paper costs. Which of the following events would leave the equilibrium price of textbooks at the same level observed before the supply shift?
A) Demand is perfectly elastic (horizontal).
B) Demand is downward sloping and shifts leftward.
C) all of the above
D) none of the above

Answer: C
Diff: 1
Section: 2.3

50) If we plot the quantity of aluminum ore mined per year on the horizontal axis and the real annual price of aluminum ore on the vertical axis, we find that the path of price–quantity combinations generally indicates lower real prices and higher quantities over time. Which of the following statements is a plausible explanation for this observed outcome?
A) Aluminum supply shifted leftward faster than the aluminum demand curve shifted rightward.
B) Aluminum supply shifted rightward faster than the aluminum demand curve shifted rightward.
C) Aluminum supply shifted rightward and aluminum demand remained constant.
D) both A and B above
E) both B and C above

Answer: E
Diff: 2
Section: 2.3

51) The income elasticity of demand is the
A) absolute change in quantity demanded resulting from a one unit increase in income.
B) percent change in quantity demanded resulting from the absolute increase in income.
C) percent change in quantity demanded resulting from a one percent increase in income.
D) percent change in income resulting from a one percent increase in quantity demanded.
E) percent change in income resulting from a one percent increase in price.

Answer: C
Diff: 1
Section: 2.4

52) The price elasticity of demand for a demand curve that has a zero slope is
A) zero.
B) one.
C) negative but approaches zero as consumption increases.
D) infinity.

Answer: D
Diff: 1
Section: 2.4

53) Elasticity measures
A) the slope of a demand curve.
B) the inverse of the slope of a demand curve.
C) the percentage change in one variable in response to a one percent increase in another variable.
D) sensitivity of price to a change in quantity.

Answer: C
Diff: 1
Section: 2.4

54) Which of the following represents the price elasticity of demand?
A) $\dfrac{\left(\frac{\Delta Q}{P}\right)}{\left(\frac{\Delta P}{Q}\right)}$ B) $\left(\frac{\Delta Q}{P}\right) + \left(\frac{\Delta P}{Q}\right)$ C) $\left(\frac{\Delta Q}{\Delta P}\right) \times \left(\frac{P}{Q}\right)$ D) $\left(\frac{\Delta Q}{P}\right) - \left(\frac{\Delta P}{Q}\right)$

Answer: C
Diff: 2
Section: 2.4

55) A vertical demand curve is
A) completely inelastic.
B) infinitely elastic.
C) highly (but not infinitely) elastic.
D) highly (but not completely) inelastic.

Answer: A
Diff: 1
Section: 2.4

56) Which of these measures the responsiveness of the quantity of one good demanded to an increase in the price of another good?

A) price elasticity.
B) income elasticity.
C) cross price elasticity.
D) cross substitution elasticity.

Answer: C
Diff: 1
Section: 2.4

57) The cross price elasticity between a pair of complementary goods will be

A) positive.
B) negative.
C) zero.
D) positive or zero depending upon the strength of the relationship.

Answer: B
Diff: 1
Section: 2.4

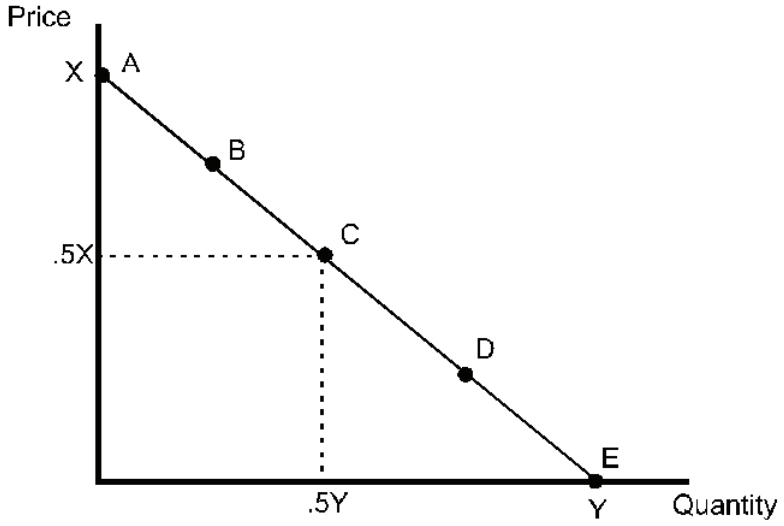


Figure 2.1

58) Refer to Figure 2.1. At point A, demand is:

A) completely inelastic.
B) inelastic, but not completely inelastic.
C) unit elastic.
D) elastic, but not infinitely elastic.
E) infinitely elastic.

Answer: E
Diff: 2
Section: 2.4

59) Refer to Figure 2.1. At point B, demand is:
A) small.
B) inelastic, but not completely inelastic.
C) unit elastic.
D) elastic, but not infinitely elastic.
E) infinitely elastic.

Answer: D
Diff: 1
Section: 2.4

60) Refer to Figure 2.1. At point C, demand is:
A) completely inelastic.
B) inelastic, but not completely inelastic.
C) unit elastic.
D) elastic, but not infinitely elastic.
E) infinitely elastic.

Answer: C
Diff: 2
Section: 2.4

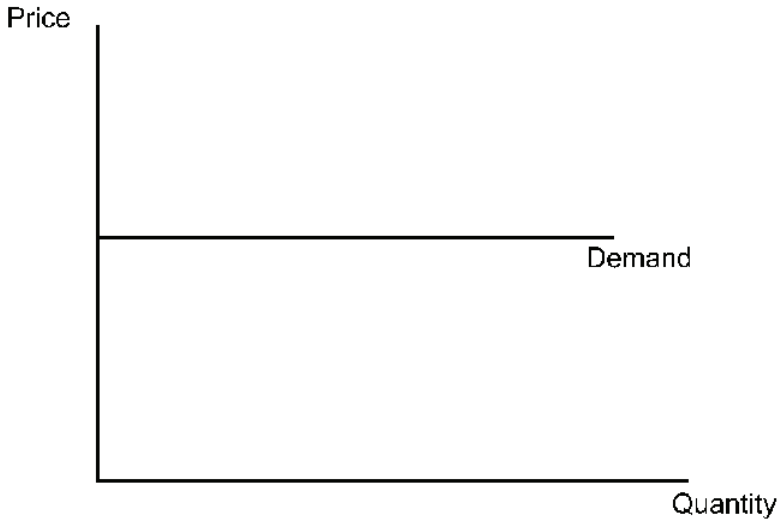
61) Refer to Figure 2.1. At point D, demand is:
A) completely inelastic.
B) inelastic, but not completely inelastic.
C) unit elastic.
D) elastic, but not infinitely elastic.
E) infinitely elastic.

Answer: B
Diff: 1
Section: 2.4

62) Refer to Figure 2.1. At point E, demand is:
A) completely inelastic.
B) inelastic, but not completely inelastic.
C) unit elastic.
D) elastic, but not infinitely elastic.
E) infinitely elastic.

Answer: A
Diff: 2
Section: 2.4

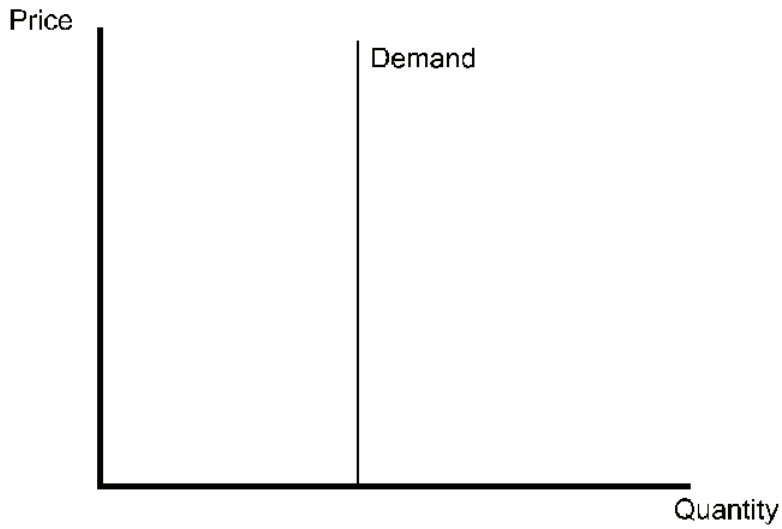
63) Which of the following statements about the diagram below is true?



A) Demand is infinitely elastic.
B) Demand is completely inelastic.
C) Demand becomes more inelastic the lower the price.
D) Demand becomes more elastic the lower the price.

Answer: A
Diff: 1
Section: 2.4

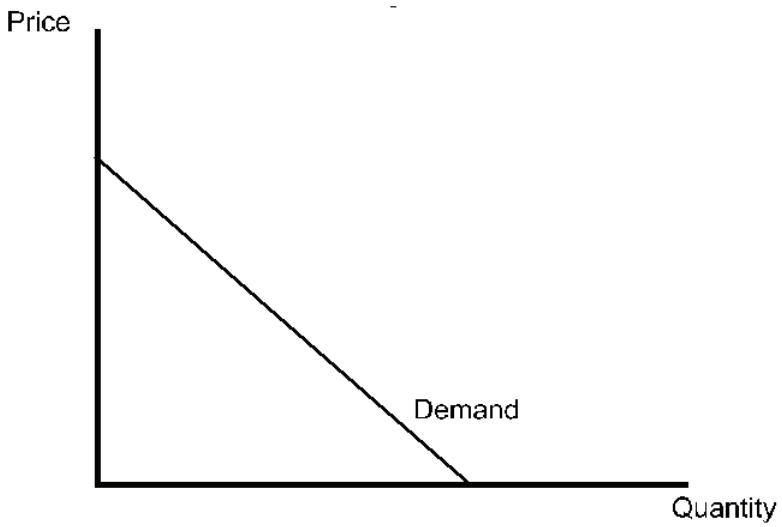
64) Which of the following statements about the diagram below is true?



A) Demand is infinitely elastic.
B) Demand is completely inelastic.
C) Demand becomes more inelastic the lower the price.
D) Demand becomes more elastic the lower the price.

Answer: B
Diff: 1
Section: 2.4

65) Which of the following statements about the diagram below is true?



A) Demand is infinitely elastic.
B) Demand is completely inelastic.
C) Demand becomes more inelastic as price declines.
D) Demand becomes more elastic as price declines.

Answer: C
Diff: 1
Section: 2.4

66) Along any downward sloping straight–line demand curve:
A) both the price elasticity and slope vary.
B) the price elasticity varies, but the slope is constant.
C) the slope varies, but the price elasticity is constant.
D) both the price elasticity and slope are constant.

Answer: B
Diff: 2
Section: 2.4

67) Which of the following pairs of goods are most likely to have a negative cross price elasticity of demand?
A) Hotdogs and hotdog buns
B) Coke and Pepsi
C) Rail tickets and plane tickets
D) A Luciano Pavarotti compact disc and a Placido Domingo compact disc (Both Pavarotti and Domingo are opera stars.)

Answer: A
Diff: 1
Section: 2.4

68) Consider the demand curve of the form $Q = a - bP$. If a is a positive real number, and $b = 0$, then demand is

A) completely inelastic. B) inelastic, but not completely.
C) unit elastic. D) elastic, but not infinitely.

Answer: A
Diff: 2
Section: 2.4

69) For most consumer goods, the own price elasticity of demand is

A) negative only when price decreases.
B) negative regardless of the direction of the price change.
C) positive only when price decreases.
D) positive regardless of the direction of the price change.

Answer: B
Diff: 1
Section: 2.4

70) If two goods are substitutes, the cross price elasticity of demand must be

A) negative. B) positive. C) zero. D) infinite.

Answer: B
Diff: 1
Section: 2.4

71) Suppose the demand for gourmet coffee can be represented by a linear demand curve. At the prevailing market price the income elasticity of demand for gourmet coffee is 2. When income rises the demand curve for gourmet coffee:

A) becomes less elastic at every price.
B) becomes less elastic at the price that prevailed before the change in income
C) becomes more elastic at every price
D) becomes more elastic at the price that prevailed before the change in income

Answer: A
Diff: 3
Section: 2.4

72) The cross–price elasticity of demand for peanut butter with respect to the price of jelly is –0.3. If we expect the price of jelly to decline by 15%, what is the expected change in the quantity demanded for peanut butter?

A) +15% B) +45% C) +4.5% D) –4.5%

Answer: C
Diff: 1
Section: 2.4

73) For U.S. consumers, the income elasticity of demand for fruit juice is 1.1. If the economy enters a recession next year and consumer income declines by 2.5%, what is the expected change in the quantity of fruit juice demanded next year?

A) –2.75% B) +2.75% C) –27.5% D) +27.5%

Answer: A
Diff: 1
Section: 2.4

74) The price elasticity of gasoline supply in the U.S. is 0.4. If the price of gasoline rises by 8%, what is the expected change in the quantity of gasoline supplied in the U.S.?

A) +3.2% B) −3.2% C) +32.0% D) +0.32%

Answer: A
Diff: 1
Section: 2.4

75) Ice cream can be frozen. In the short run the magnitude of the own price elasticity of demand for ice cream:

A) is higher than in the long run.
B) is lower than in the short run.
C) is the same as in the long run.
D) does not depend on the fact that ice cream can be frozen.

Answer: A
Diff: 3
Section: 2.5

76) The introduction of refrigerators into American homes:

A) decreased the magnitude of the short run own price elasticity of demand for raw meat.
B) did not affect the short run own price elasticity of demand for raw meat.
C) increased the magnitude of the short run own price elasticity of demand for raw meat.
D) decreased the magnitude of the short run own price elasticity of demand for smoked meats.

Answer: C
Diff: 3
Section: 2.5

77) Use the following statements to answer this question:

I. Even though people need water to survive, the price of water is less than the price of diamonds because water is in greater supply than diamonds.

II. Suppose that the demand for corn is highly price inelastic. If every corn farmer's harvesting technologies become more efficient, the total revenue received by all corn farmers would fall.

A) I and II are true. B) I is true, and II is false.
C) II is true, and I is false. D) I and II are false.

Answer: A
Diff: 3
Section: 2.5

78) Due to capacity constraints, the price elasticity of supply for most products is:

A) the same in the long run and the short run.
B) greater in the long run than the short run.
C) greater in the short run than in the long run.
D) too uncertain to be estimated.

Answer: B
Diff: 1
Section: 2.5

79) In the long run, new firms can enter an industry and so the supply elasticity tends to be
A) more elastic than in the short run.
B) less elastic than in the short run.
C) perfectly elastic.
D) perfectly inelastic.

Answer: A
Diff: 1
Section: 2.5

80) A freeze in Florida's orange growing regions will:
A) result in a sharp increase in the price of oranges in the short run because demand and supply are highly inelastic.
B) result in a sharp increase in the price of oranges in the short run because demand and supply are highly elastic.
C) result in a sharp decrease in the price of oranges in the short run because demand is highly inelastic and supply is highly elastic.
D) result in little change in the price of oranges in the short run because supply is infinitely elastic.

Answer: A
Diff: 2
Section: 2.5

81) Use the following two statements to answer this question:
I. The supply of newly mined copper is more elastic in the long run than in the short run.
II. The supply of scrap copper is more elastic in the short run than in the long run.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 3
Section: 2.5

82) This year a new oil field with substantial reserves has been discovered. Such discoveries are not made every year. Therefore an increase in the demand for oil will:
A) increase the long run price of oil more than the short run price of oil.
B) increase the long run price of oil less than the short run price of oil.
C) ensure the long run price of oil and short run price of oil increase by the same amount.
D) ensure that the short run price of oil falls.
E) ensure that the short run price of oil remains unchanged.

Answer: B
Diff: 3
Section: 2.5

83) An important determinant of the amount of grains harvested next year by Ethiopian farmers is the amount of seeds planted this year. Given that Western nations have guaranteed to donate five hundred tons of grain next year, this year the Ethiopian farmers will:
A) plant more seeds as the food aid establishes a minimum price for grain.
B) plant more seeds as the farmers' confidence is restored.
C) plant the same amount of seeds as they would have without the food aid.
D) plant fewer seeds as consumers demand for grain is completely price elastic.
E) plant fewer seeds as the price of grain will be lower with the food aid.

Answer: E
Diff: 3
Section: 2.5

84) There are two techniques of egg production: free range (where hens roam around the farm) or factory (where hens are fed and watered in wire cages). The free range technique has a much more elastic supply curve than the factory technique. When the demand for eggs falls:
A) egg production using the factory technique falls less than with the free range technique.
B) egg production using the factory technique falls more than with the free range technique.
C) the production using both techniques falls by the same amount.
D) the factory egg producers supply curve shifts inward.
E) the free range egg producers supply curve shifts inward.

Answer: A
Diff: 2
Section: 2.5

85) A demand curve of the form: Q = a – bP, where a and b are positive real numbers,:
A) is an upward sloping straight line.
B) has a constant price elasticity of demand.
C) is a downward sloping straight line.
D) is a parabolic curve.

Answer: C
Diff: 2
Section: 2.5

86) Consider a supply curve of the form: Q = c + dP. If d equals zero, then supply is:
A) completely inelastic.
B) inelastic, but not completely inelastic.
C) elastic, but not infinitely elastic.
D) infinitely elastic

Answer: A
Diff: 2
Section: 2.5

87) Consider a linear, upward sloping supply curve. If the supply curve shifts upward, then:
A) the price elasticity of supply will increase.
B) the price elasticity of supply will increase if the slope of the supply curve is greater than one.
C) the price elasticity of supply will increase if the slope of the supply curve is greater than one and the lowest price needed to induce firms to supply anything is positive.
D) the price elasticity of supply will be constant.
E) none of the above

Answer: C
Diff: 3
Section: 2.5

88) For computers and other business equipment, small changes in business earnings tend to generate relatively large short–run changes in the demand for this equipment. In the long run, the responsiveness of demand for business equipment with respect to income changes tends to be:
A) even more responsive.
B) less responsive.
C) equally responsive.
D) none of the above

Answer: B
Diff: 2
Section: 2.5

89) For computers and other business equipment, small changes in business earnings tend to generate relatively large short–run changes in the demand for this equipment, and the long–run income response tends to be smaller. Industries that face demand behavior of this type are known as:
A) natural monopolies.
B) cartels.
C) cyclical industries.
D) constant–cost industries.

Answer: C
Diff: 2
Section: 2.5

90) For automobile demand in the U.S., the income response tends to be larger in the:
A) short run.
B) long run.
C) The income response is the same in the long run and the short run.
D) We do not have enough information to answer this question.

Answer: A
Diff: 1
Section: 2.5

91) A simple linear demand function may be stated as $Q = a - bP + cI$ where Q is quantity demanded, P is the product price, and I is consumer income. To compute an appropriate value for c, we can use observed values for Q and I and then set the estimated income elasticity of demand equal to:
A) c(I/Q)
B) c(Q/I)
C) –b(I/Q)
D) Q/(cI)

Answer: A
Diff: 2
Section: 2.6

92) A simple linear demand function may be stated as $Q = a - bP + cI$ where Q is quantity demanded, P is the product price, and I is consumer income. To compute an appropriate value for b, we can use observed values for Q and P and then set –b(P/Q) equal to the:
A) income elasticity of demand.
B) cross–price elasticity of demand.
C) price elasticity of demand.
D) price elasticity of supply.

Answer: C
Diff: 2
Section: 2.6

93) When the government controls the price of a product, causing the market price to be above the free market equilibrium price,
A) all producers gain.
B) both producers and consumers gain.
C) only consumers gain.
D) some, but not all, sellers can find buyers for their goods.

Answer: D
Diff: 1
Section: 2.7

94) When the government controls the price of a product, causing the market price to be below the free market equilibrium price,
A) some consumers gain from the price controls and other consumers lose.
B) all producers gain from the price controls.
C) both producers and consumers gain.
D) all consumers are better–off.

Answer: A
Diff: 1
Section: 2.7

95) Suppose that, at the market clearing price of natural gas, the price elasticity of demand is –1.2 and the price elasticity of supply is 0.6. What will result from a price ceiling that is 10 percent below the market clearing price?
A) A shortage equal to 1.8 percent of the market clearing quantity
B) A shortage equal to 0.6 percent of the market clearing quantity
C) A shortage equal to 18 percent of the market clearing quantity
D) A shortage equal to 6 percent of the market clearing quantity
E) More information is needed.

Answer: C
Diff: 2
Section: 2.7

96) What happens if price falls below the market clearing price?
A) Demand shifts out.
B) Supply shifts in.
C) Quantity demanded decreases, quantity supplied increases, and price falls.
D) Quantity demanded increases, quantity supplied decreases, and price rises.

Answer: D
Diff: 1
Section: 2.7

97) Which of the following results from a binding price floor?
A) Equilibrium
B) Excess demand
C) Excess supply
D) Shortage

Answer: C
Diff: 1
Section: 2.7

98) Other things being equal, the increase in rents that occurs after rent controls are abolished is smaller when
A) the own price elasticity of demand for rental homes is price inelastic.
B) the own price elasticity of demand for rental homes is price elastic.
C) the own price elasticity of demand for rental homes has unitary price elasticity.
D) rented homes and owned homes are complements.
E) rented homes and owned homes are substitutes.

Answer: B
Diff: 2
Section: 2.7

99) Suppose the U.S. government imposes a maximum price of $5 per gallon of gasoline, and the current equilibrium price is $3.50 per gallon. This policy represents a:

A) binding price floor. B) non–binding price floor.
C) binding price ceiling. D) non–binding price ceiling.

Answer: D
Diff: 1
Section: 2.7

100) Which of the following public policies is an example of a price ceiling?

A) Support prices for agricultural commodities
B) Minimum wage laws
C) Rent control program
D) all of the above

Answer: C
Diff: 1
Section: 2.7

101) The inverse demand curve for product X is given by:

$$P_X = 25 - 0.005Q + 0.15P_Y,$$

where P_X represents price in dollars per unit, Q represents rate of sales in pounds per week, and P_Y represents selling price of another product Y in dollars per unit. The inverse supply curve of product X is given by: $P_X = 5 + 0.004Q$.

a. Determine the equilibrium price and sales of X. Let $P_Y = \$10$.
b. Determine whether X and Y are substitutes or complements.

Answer: ***a.*** Equate supply to demand to calculate Q.

$$25 - 0.005Q + 0.15(10) = 5 + 0.004Q$$
$$21.5 = 0.009Q$$
$$Q = 2{,}388.9 \text{ units per week}$$

At $Q = 2{,}388.9$, $P = 25 - .005(2{,}388.9) + 0.15(10)$
$= \$14.56$ per unit.

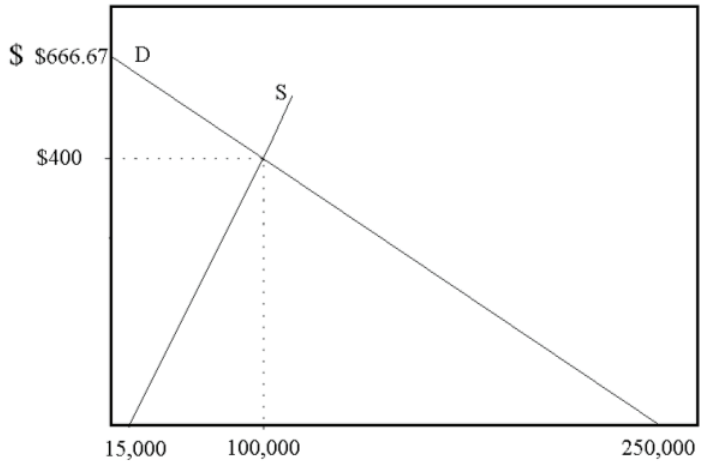
b. Since we can solve for quantity demanded as a function of prices,

$$Q = \frac{25 + 0.15P_Y - P_X}{0.005}$$

we see that there is a direct, positive relationship between Q and P_Y. An increase in the price of good Y generates an increase in the quantity demanded for good X at any value of P_X, which implies that goods Y and X are substitutes.

Diff: 2
Section: 2.2

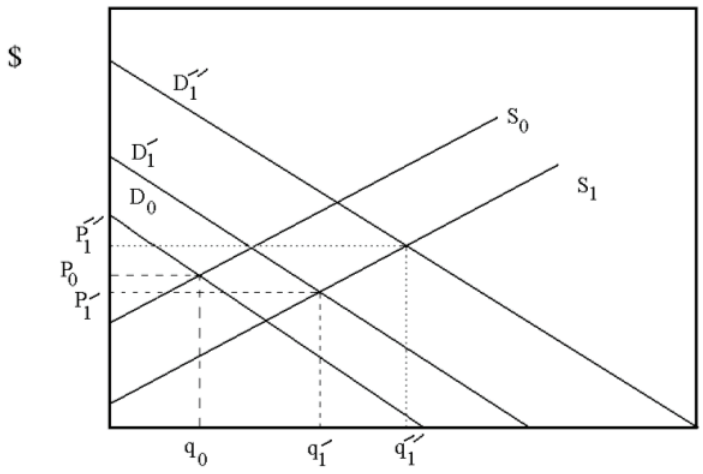
102) The daily demand for hotel rooms on Manhattan Island in New York is given by the equation $Q_D = 250{,}000 - 375P$. The daily supply of hotel rooms on Manhattan Island is given by the equation $Q_S = 15{,}000 + 212.5P$. Diagram these demand and supply curves in price and quantity space. What is the equilibrium price and quantity of hotel rooms on Manhattan Island?



Answer: The equilibrium price can be found by equating quantity demanded and quantity supplied (graphically, this is where the Demand and Supply curves intersect). The solution for the equilibrium price may be derived from $Q_D = 250{,}000 - 375P = 15{,}000 + 212.5P = Q_S$. We can then solve for equilibrium price as $P = \frac{235{,}000}{587.5} = 400$. At a price of $400, quantity supplied and quantity demanded are 100,000.

Diff: 1
Section: 2.2

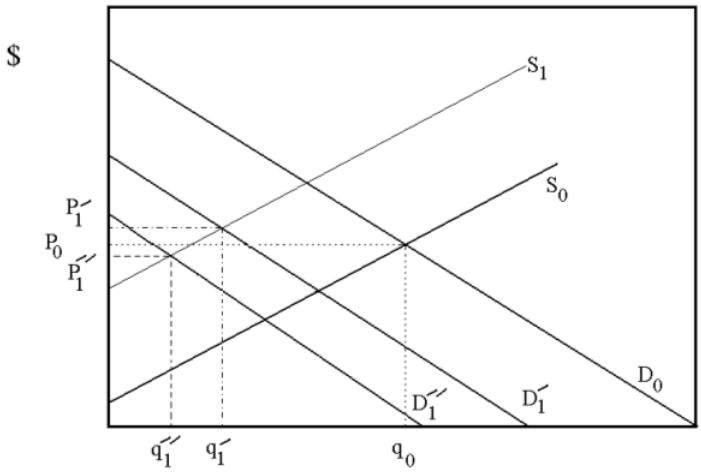
103) Suppose a new discovery in computer manufacturing has just made computer production cheaper. Also, the popularity and usefulness of computers continues to grow. Use Supply and Demand analysis to predict how these shocks will affect equilibrium price and quantity of computers. Is there enough information to determine if market prices will rise or fall? Why?



Answer: The increase in demand due to the usefulness of computers will shift the demand curve to the right. This effect alone on the market will influence the market price and quantity to rise. This is shown above by a movement from the original demand curve D_0 to a new demand curve such as D_1' or D_1''. The reduction in the cost of producing computers will result in an increase in supply (a rightward shift of the supply curve). This effect alone on the market will influence the price of computers to fall while the quantity will increase. Note that the supply and demand effects on price work in opposite directions. If the supply effect dominates the demand effect, the equilibrium prices will fall. This is exhibited by the increase in demand to only D_1'. On this demand curve, the net effect is for prices to fall from P_0 to P_1'. On the other hand if the demand effect dominates, equilibrium prices will rise. This is exhibited by the increase in demand to D_1''. On this demand curve, the net effect is for prices to rise from P_0 to P_1''. As we don't know given the current information which effect dominates, we can't perfectly predict the change in price. The change in quantity is unambiguously increased.

Diff: 2
Section: 2.3

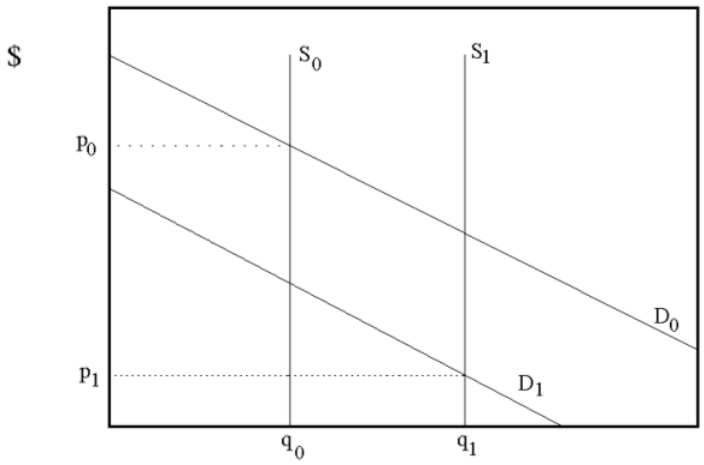
104) Suppose that due to more stringent environmental regulation it becomes more expensive for steel production firms to operate. Also, recent technological advances in plastics has reduced the demand for steel products. Use Supply and Demand analysis to predict how these shocks will affect equilibrium price and quantity of steel. Can we say with certainty that the market price for steel will fall? Why?



Answer: The increase in the cost of production of steel will shift the supply curve to the left. This effect alone on the market will influence the market price to rise while the market quantity will fall. This is shown above by a movement from the original supply curve S_0 to a new supply curve such as S_1. The decrease in demand will cause the demand curve to shift to the left. This effect alone on the market will influence the market price and quantity of steel to fall. Note that the supply and demand effects on price work in opposite directions. If the supply effect dominates the demand effect, the equilibrium prices will rise. This is exhibited by the decrease in demand to D_1'. On this demand curve, the net effect is for prices to rise from P_0 to P_1'. On the other hand if the demand effect dominates, the equilibrium price will decline. This is exhibited by the decrease in demand to D_1''. On this demand curve, the net effect is for prices to fall from P_0 to P_1''. As we don't know given the current information which effect dominates, we can't perfectly predict the change in price. The change in equilibrium quantity is unambiguously decreased.

Diff: 2
Section: 2.3

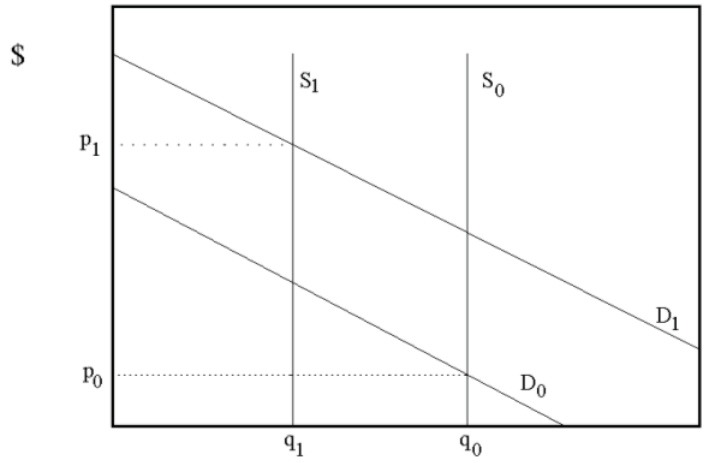
105) Historically, investors have considered gold commodities to be a good investment to preserve wealth in times of inflation. If investors are no longer worried about inflation and gold demand decreases, what do you expect will happen to gold prices? How would your answer change if you learn that a recent gold mine discovery will increase the supply of gold?



Answer: The decrease in gold demand due to reduced fears of inflation will shift the demand curve to the left. This is indicated above by a movement from D_0 to D_1. The effect on gold prices is negative. If new gold discoveries increase the supply of gold, the supply curve will shift to the right. This effect will also exert downward pressure on gold prices. This effect is diagrammed above as a movement from S_0 to S_1. Since both effects cause gold prices to become lower, we can say unambiguously that gold prices will decline.

Diff: 2
Section: 2.3

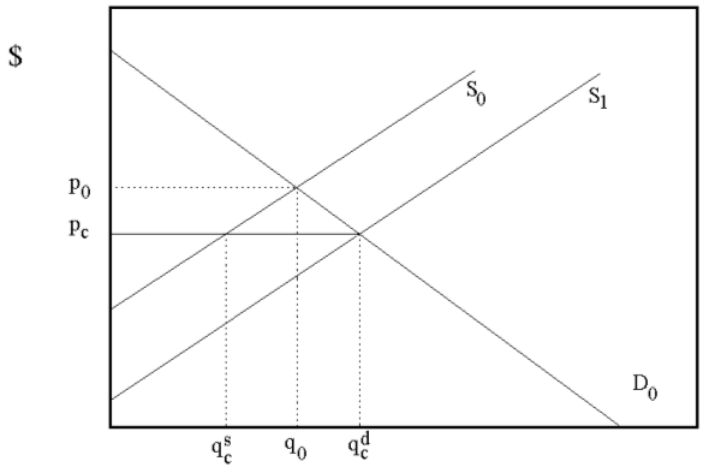
106) The currency used by the Confederate States of America during its brief existence from 1861 to 1865 has become a collector's item today. The Confederate Currency supply is perfectly inelastic. As the demand for the collectible increases and some of the old currency is destroyed or no longer of value as a collectible, what happens to the market price?



Answer: The increase in demand for Confederate currency will result in a rightward shift of demand from D_0 to D_1. This demand effect will put upward pressure on the price of Confederate currency. As some of the collectibles deteriorate and become worthless, the supply curve shifts back to the left as indicated above by the movement from S_0 to S_1. The supply effect places upward pressure on prices. Both effects put upward pressure on prices, so we can say unambiguously that prices for Confederate currency will rise.

Diff: 2
Section: 2.3

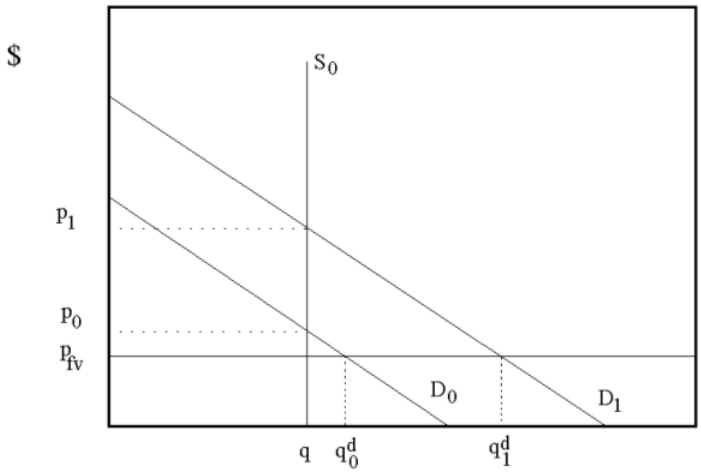
107) Suppose the cable TV industry is currently unregulated. However, due to complaints from consumers that the price of cable TV is too high, the legislature is considering placing a price ceiling on cable TV below the current equilibrium price. Assuming the government does make this price ceiling law, please construct a diagram that shows the impact of this law on the cable TV market, and please briefly explain the effects on market prices and quantities with supply and demand analysis. Also, if the cable TV company is worried about disgruntling customers, the company may introduce a different type of programming that is cheaper for the company to provide yet is equally appealing to customers. What would be the effects of this action?



Answer: Before implementation of the price ceiling, the equilibrium price and quantity is given by the intersection of demand and supply. This is illustrated above as p_0 and q_0. A price ceiling below the initial equilibrium price will cause a shortage. That is quantity demanded (q^d_c) at the price ceiling (p_c) exceeds quantity supplied (q^s_c). To avoid upsetting consumers, the company may provide a lower quality cable TV subscription. This cheaper package would increase the supply of cable TV. The supply curve will rightward. This action will move towards eliminating the cable TV shortage as the quantity supplied of the modified package increases.

Diff: 2
Section: 2.3

108) Suppose that the resale of tickets to professional football games is illegal in Missouri. Due to the high demand for Chiefs (who play in Kansas City, Missouri) tickets there is a shortage of tickets at the current ticket price. Given that the Chiefs will not raise the price at which they sell the tickets, what would be the result of allowing tickets to be resold in a secondary market at whatever price the market would support? If speculators entered the market and began buying tickets directly from the Chiefs in hopes of reselling the tickets later, what would happen to the line outside of the ticket offices when the tickets are initially sold?



Answer: Initially, there is a shortage due to the prohibition of resale of tickets above face value. That is quantity demanded (q^d_0) exceeds quantity supplied (q) at the face value price (p_{fv}). If resale of tickets is allowed, the shortage will disappear as market forces bid the price of Chief tickets up to the price at which quantity demanded and supplied are equal. If the Chiefs organization continues to sell tickets at p_0, speculators may begin purchasing the tickets directly in hopes of reselling the tickets on the secondary market for higher prices. The influx of speculative demand will shift the demand curve to the right. This implies that at face value, there is even a greater shortage for tickets, and the line outside the ticket office will grow longer.

Diff: 3
Section: 2.3

109) Harding Enterprises has developed a new product called the Gillooly Shillelagh. The market demand for this product is given as follows:

$$Q = 240 - 4P$$

a. At what price is the price elasticity of demand equal to zero?
b. At what price is demand infinitely elastic?
c. At what price is the price elasticity of demand equal to one?
d. If the shillelagh is priced at \$40, what is the point price elasticity of demand?

Answer: a. The demand curve given in this problem is linear. The intercepts of the inverse demand curve on the price and quantity axes are \$60 and 240 respectively. The price elasticity of demand varies along the length of this demand curve. Demand is infinitely elastic at the intercept on the price axis. Demand is completely inelastic at the intercept on the quantity axis. Demand is unit elastic at the half-way point between these two extremes. Thus, the price elasticity of demand equals zero (is completely inelastic) at a price of zero.

b. Demand is infinitely elastic at a price of \$60.
c. The price elasticity of demand equals one at a price of \$30.
d. The price elasticity of demand equals $\left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right)$ If P equals \$40, Q equals 80. $\left(\frac{\Delta Q}{\Delta P}\right)$ is constant along a linear demand curve. In this case it equals –4. Therefore, the price elasticity of demand equals (40/80)(–4) = –2.

Diff: 2
Section: 2.4

110) The demand for a bushel of wheat in 1981 was given by the equation $Q_D = 3550 - 266P$. At a price of \$3.46 per bushel, what is the price elasticity of demand? If the price of wheat falls to \$3.27 per bushel, what happens to the revenue generated from the sale of wheat?

Answer: At a price of \$3.46 per bushel, the quantity demanded for wheat is 2,629.64 bushels of wheat. At a price of \$3.27 per bushel, the quantity demanded for wheat is 2,680.18. The price elasticity of demand at \$3.46 is $E_D = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right) = \left(\frac{3.46}{2{,}629.64}\right)\left(\frac{50.54}{-0.19}\right) = -0.35$. At a price of \$3.46 per bushel, the revenue generated from the sale of wheat is \$12,558.554. At a price of \$3.27 per bushel, the revenue generated from the sale of wheat is \$8,764.1886. Wheat revenue drops by \$3,794.366 when price decreases from \$3.46 to \$3.27 per bushel, which is expected when prices decline along the inelastic portion of a demand curve.

Diff: 2
Section: 2.4

111) The demand for packs of Pokemon cards is given by the equation $Q_D = 500{,}000 - 45{,}000P$. At a price of \$2.50 per pack, what is the quantity demanded? At \$5.00 per pack, what is the price elasticity of demand?

Answer: At a price of \$2.50 per pack, the quantity demanded is 387,500 packs of cards. At a price of \$5.00 per pack, the quantity demanded is 275,000. At \$5.00 per pack, the price elasticity of demand is $E_D = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right) = \left(\frac{5}{275{,}000}\right)\left(\frac{-112{,}500}{2.50}\right) = -0.818$.

Diff: 1
Section: 2.4

112) The monthly supply of desktop personal computers is given by the equation $Q_S = 15{,}000 + 43.75P$. At a price of \$800, what is the price elasticity of supply?

Answer: At a price of \$800, the quantity supplied is 50,000. The price elasticity of supply is

$$E_S = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right) = \left(\frac{800}{50{,}000}\right)(43.75) = 0.7$$

Diff: 1
Section: 2.4

113) The demand for tickets to the Daytona 500 NASCAR event is given by the equation $Q_D = 350{,}000 - 800P$. The supply of tickets to the event is given by the capacity of the Daytona track, which is 150,000. What is the equilibrium price of tickets to the event? What is the price elasticity of demand at the equilibrium price? What is the price elasticity of supply at the equilibrium price?

Answer: Consumers are willing to pay $P = \frac{200{,}000}{800} = \$250$ per ticket. The price elasticity of demand at \$250 is $E_D = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right) = \left(\frac{250}{150{,}000}\right)(-800) = -1\frac{1}{3}$. The price elasticity of supply is $E_S = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right) = \left(\frac{250}{150{,}000}\right)(0) = 0.$

Diff: 2
Section: 2.4

114) Midcontinent Plastics makes 80 fiberglass truck hoods per day for large truck manufacturers. Each hood sells for \$500.00. Midcontinent sells all of its product to the large truck manufacturers. Suppose the own price elasticity of demand for hoods is 0.4 and the price elasticity of supply is 1.5.

a. Compute the slope and intercept coefficients for the linear supply and demand equations.
b. If the local county government imposed a per unit tax of \$25.00 per hood manufactured, what would be the new equilibrium price of hoods to the truck manufacturer?
c. Would a per unit tax on hoods change the revenue received by Midcontinent?

Answer: Given: $P^* = \$500$ $Q^* = 80$ hoods per day
$E_d = -0.40$ $E_s = 1.5$

a. Demand: $Q_d = a_0 + a_1P$ Supply: $Q_s = b_0 + b_1P$

Use: $E = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$ to compute a_1 and b_1.

$-0.4 = \frac{500}{80}a_1$ $1.5 = \frac{500}{80}b_1$

$a_1 = -0.064$ $b_1 = 0.24$

Solve for a_0 and b_0

$Q_d = a_0 + a_1P$ $Q_s = b_0 + b_1P$
$80 = a_0 + -0.064(500)$ $80 = b0 + 0.24(500)$
$a_0 = 112$ $b_0 = -40$
$Q_d = 112 - 0.064P$ $Q_s = -40 + 0.24P$

b. The tax represents a price increase to the purchaser regardless of the current price. Thus, the supply curve will be adjusted vertically upward by \$25.
$Q_S = -40 + 0.24P$ or
$P = 166.67 + 4.17\,Q_S$, then
$P_t = P + \$25 = 166.67 + 25 + 4.17Q_S$
$P_t = 191.67 + 4.17Q_S$ or
$Q_S = -45.96 + 0.24P$

The new equilibrium price will be:
New Supply = Demand
$Q_S = -45.96 + 0.24P = 112 - 0.064P = Q_d$
Solving yields P = \$519.60 per truck hood

c. Since the new selling price in (c) is \$519.60 and the tax is \$25 per hood, Midcontinent would receive only \$494.6 per hood. As quantity sold has fallen too, revenues would fall.

Diff: 3
Section: 2.6

115) Suppose that a small market Major League Baseball team currently charges \$12 for a ticket. At this price, they are able to sell 12,000 tickets to each game. If they raise ticket prices to \$15, they would sell 11,053 tickets to each game. What is the price elasticity of demand at \$12? If the demand curve is linear, what is the algebraic expression for demand?

Answer: The price elasticity of demand is $E = \left(\frac{P}{Q}\right)\left(\frac{\triangle Q}{\triangle P}\right) = \left(\frac{12}{12{,}000}\right)\left(\frac{-947}{3}\right) = -0.316$. If the demand curve is linear, it is in the form of $Q_D = a + bP$. Also, we know that $E = b\left(\frac{P}{Q}\right) \Leftrightarrow b = E\left(\frac{Q}{P}\right) = -0.316\left(\frac{12{,}000}{12}\right) = -316$. Rearranging the linear expression for demand allows us to solve for a as follows: $a = Q_D - bP \Rightarrow a = 12{,}000 + 316(12) = 15{,}792$. We may now write the linear expression for demand as $Q_D = 15{,}792 - 316P$.

Diff: 2
Section: 2.6

116) Suppose that the short–run world demand and supply elasticities for crude oil are –0.076 and 0.088, respectively. The current price per barrel is $30 and the short–run equilibrium quantity is 23.84 billion barrels per year. Derive the linear demand and supply equations.

Answer: If the demand curve is linear, it is in the form of $Q_D = a + bP$ Also, we know that $E = b\left(\frac{P}{Q}\right) \Leftrightarrow b = E\left(\frac{Q}{P}\right) = -0.076\left(\frac{23.84}{30}\right) = -0.060$. Rearranging the linear expression for demand allows us to solve for a as follows:
$a = Q_D - bP \Rightarrow a = 23.84 + 0.060(30) = 25.640$. We may now write the linear expression for demand as $Q_D = 25.640 - 0.060P$. If the supply curve is linear, it is in the form of $Q_S = c + dP$. Also, we know that $E = d\left(\frac{P}{Q}\right) \Leftrightarrow d = E\left(\frac{Q}{P}\right) = 0.088\left(\frac{23.84}{30}\right) = 0.070$.
Rearranging the linear expression for demand allows us to solve for c as follows:
$c = Q_S - dP \Rightarrow c = 23.84 - 0.070(30) = 21.740$. We may now write the linear expression for supply as $Q_S = 21.740 + 0.070P$.

Diff: 2
Section: 2.6

117) Suppose that the long–run world demand and supply elasticities of crude oil are –0.906 and 0.515, respectively. The current long–run equilibrium price is $30 per barrel and the equilibrium quantity is 16.88 billion barrels per year. Derive the linear long–run demand and supply equations. Next, suppose the long–run supply curve you derived above consists of competitive supply and OPEC supply. If the long–run competitive supply equation is: $S_C = 7.78 + 0.29P$, what must be OPEC's level of production in this long–run equilibrium?

Answer: If the demand curve is linear, it is in the form of $Q_D = a + bP$. Also, we know that $E = b\left(\frac{P}{Q}\right) \Leftrightarrow b = E\left(\frac{Q}{P}\right) = -0.906\left(\frac{16.88}{30}\right) = -0.510$. Rearranging the linear expression for demand allows us to solve for a as follows:
$a = Q_D - bP \Rightarrow a = 16.88 + 0.510(30) = 32.180$. We may now write the linear expression for demand as $Q_D = 32.18 - 0.510P$. If the supply curve is linear, it is in the form of $Q_S = c + dP$. Also, we know that $E = d\left(\frac{P}{Q}\right) \Leftrightarrow d = E\left(\frac{Q}{P}\right) = 0.515\left(\frac{16.88}{30}\right) = 0.290$.
Rearranging the linear expression for demand allows us to solve for c as follows:
$c = Q_S - dP \Rightarrow c = 16.88 - 0.290(30) = 8.18$. We may now write the linear expression for supply as $Q_S = 8.18 + 0.290P$. OPEC's supply is the difference between the world supply and competitive supply at $30. We know that world supply at $30 is 16.88. Competitive supply at $30 is 7.78 + 0.29(30) = 16.48. This implies that OPEC's supply is 0.4 billion barrels per year at $30 in this long–run equilibrium.

Diff: 3
Section: 2.6

118) The U.S. Department of Agriculture is interested in analyzing the domestic market for corn. The USDA's staff economists estimate the following equations for the demand and supply curves:

$Q_d = 1{,}600 - 125P$
$Q_S = 440 + 165P$

Quantities are measured in millions of bushels; prices are measured in dollars per bushel.

a. Calculate the equilibrium price and quantity that will prevail under a completely free

market.

b. Calculate the price elasticities of supply and demand at the equilibrium values.

c. The government currently has a $4.50 bushel support price in place. What impact will this support price have on the market? Will the government be forced to purchase corn under a program that requires them to buy up any surpluses? If so, how much?

Answer: ***a.*** Set $Q_d = Q_s$ to determine price.

$1600 - 125P = 440 + 165P$

$1160 = 290P$

$P = 4$

Obtain Q by substituting into either expression.

$Q_d = 1600 - 125(4)$

$Q_d = 1600 - 500$

$Q = 1100$

$P^* = \$4, Q^* = 1100$

b. For the Own Price Elasticity of Demand $E = -125 \times \frac{4}{1100} = -0.45$ (approximately)

For the Own Price Elasticity of Supply $E = -165 \times \frac{4}{1100} = 0.60$

c. Calculate Q_d and Q_s at the $4.50 price

$Q_d = 1600 - 125(4.5)$

$Q_d = 1037.5$

$Q_s = 440 + 165(4.5)$

$Q_s = 1182.5$

surplus $= Q_s - Q_d = 1182.5 - 1037.5 = 145$

The support price would create an excess supply of 145 million bushels that the government would be forced to buy.

Diff: 2
Section: 2.7

119) The market for gravel has been estimated to have these supply and demand relationships:

Supply $P = 10 + 0.01Q$

Demand $P = 100 - 0.01Q$,

where P represents price per unit in dollars, and Q represents sales per week in tons. Determine the equilibrium price and sales. Determine the amount of shortage or surplus that would develop at P = $40/ton.

Answer: The equilibrium price can be found by equating S to D in terms of Q.

$10 + 0.01Q = 100 - 0.01Q$

$0.02Q = 90$

$Q = 4{,}500$ tons/week

$P = 10 + 0.01(4{,}500) = \$55$/ton.

At P = $40/ton, the quantity demanded is:

$40 = 100 - 0.01Q$ – or – $Q = 6{,}000$ tons/week

The quantity supplied is:

$40 = 10 + 0.01Q$ – or – $Q = 3{,}000$ tons/week

The shortage is 3,000 tons/week.

Diff: 2
Section: 2.7

120) American Mining Company is interested in obtaining quick estimates of the supply and demand curves for coal. The firm's research department informs you that the elasticity of supply is approximately 1.7, the elasticity of demand is approximately –0.85, and the current price and quantity are $41 and 1,206, respectively. Price is measured in dollars per ton, quantity the number of tons per week.

a. Estimate linear supply and demand curves at the current price and quantity.
b. What impact would a 10% increase in demand have on the equilibrium price and quantity?
c. If the government refused to let American raise the price when demand increased in (b) above, what shortage is created?

Answer: ***a.*** First we estimate the demand curve

$Q = a_0 - b_0P$

$$\text{Elasticity of demand} = b_0 \times \frac{P}{Q}$$

$$.85 = b_0 \times \frac{41}{1206}$$

$-1025.1 = b_0 \times 41$

$b_0 = 25$

$Q = a_0 - b_0P$

$1206 = a_0 - 25(41)$

$1206 = a_0 - 1025$

$a_0 = 2231$

$Q_0 = 2231 - 25P$

Next, we estimate the supply curve

$Q = a_1 + b_1P$

$$\text{Elasticity of Supply} = b_1 \times \frac{P}{Q}$$

$$1.7 = b_1 \times \frac{41}{1206}$$

$2050.2x = b_1 \times 41$

$b_1 = 50$

$Q = a_1 + b_1P$

$1206 = a_1 + 50(41)$

$a_1 = -844$

$Q_S = -844 + 50P$

Check to see if correct:

Set $Q_S = Q_d$

$2231 - 25P = -844 + 50P$

$3075 = 75P$

$P = 41$

The equations are correct.

b. Multiply demand equation by 1.10

$1.10\ (2231 - 25P)$

$Q_d' = Q_S$ and solve

$Q_S = -844 + 50P$

Set $Q_d' = Q_S$ and solve.

$2454.1 - 27.5P = -844 + 50P$

$3298.1 = 77.5P$

$P = 42.56$

Substitute P into Q_d' to find quantity demanded

$Q_d' = 2454.1 - 27.5(42.56)$

$Q_d' = 1283.7$ or 1284

c. Since price cannot rise, the shortage will be the quantity demanded with the new demand minus the quantity supplied with the unchanged supply

Quantity demanded: $Q = 2454.1 - 27.5(41) = 1326.6$

Quantity supplied: $Q = -844 + 50(41) = 1206.0$

Shortage = 1326.6 – 1206.0 = 120.6 tons per week.

Diff: 3
Section: 2.7

121) In a city with a medium sized population, the equilibrium price for a city bus ticket is $1.00, and the number of riders each day is 10,800. The short–run price elasticity of demand is –0.60, and the short–run elasticity of supply is 1.0.

a. Estimate the short run linear supply and demand curves for bus tickets.
b. If the demand for bus tickets increased by 10% because of a rise in the world price of oil, what would be the new equilibrium price of bus tickets?
c. If the city council refused to let the bus company raise the price of bus tickets after the demand for tickets increases (see (b) above), what daily shortage of tickets would be created?
d. Would the bus company have an incentive to increase the supply in the long run given the city council's decision in (c) above? Explain your answer.

Answer: Given: $P^* = \$1.00$ per ticket $Q^* = 10{,}800$
$E_d = -0.60$ $E_s = 1.0$

a. Demand: $Q_d = a_0 + a_1P$ Supply: $Q_s = b_0 + b_1P$

Use: $E = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$ to compute a_1 and b_1.

$$E_d = \frac{1}{10{,}800}a_1 \qquad E_s = \frac{1}{10{,}800}b_1$$

$$-0.60 = \frac{1}{10{,}800}a_1 \qquad 1.0 = \frac{1}{10{,}800}b_1$$

$$a_1 = -6{,}480 \qquad b_1 = 10{,}800$$

Solve for a_0 in $Q_d = a_0 + a_1P$

$$10{,}800 = a_0 - 6{,}480.00(1.0)$$

$$a_0 = 17{,}280$$

$$Q_d = 17{,}280 - 6{,}480P$$

Solve for b_0 in $Q_s = b_0 + b_1P$

$$10{,}800 = b_0 + 10{,}800.00(1.0)$$

$$b_0 = 0.0$$

$$Q_s = 0.0 + 10{,}800P$$

b. New demand $= (1.10)Q_d = (17{,}280 - 6{,}480P)(1.10)$

$Q_d' = 19{,}008.00 - 7{,}128P$

Equate Q_d' to Q_s to get new equilibrium price.

$19{,}008 - 7{,}128P = 0.0 + 10{,}800\ P$

$P^* = \$1.06$ per ticket

c. The shortage would be the quantity demanded at $P = \$1.00$ minus the quantity supplied at P=$1.00

$Q_d = 19{,}008 - 7{,}128(\$1.00) =$ 11,880

$Q_s = 0.0 + 10{,}800(\$1.00) =$ 10,800

Shortage $= 11{,}800 - 10{,}800 =$ 1,080 rides per day

d. No. The bus company has no incentive to supply more than 10,800 rides per day, as long as the price is restricted at $1.00.

Diff: 3
Section: 2.7

122) The current price charged by a local movie theater is $8 per ticket. The concession stand at the theater averages $5 in revenue for each ticket sold. At the current ticket price, the theater typically sells 300 tickets per showing. If the theater raises ticket prices to $9, the theater will sell 270 tickets. What is the price elasticity of demand at $8? What happens to ticket revenue if the theater increases ticket prices to $9 from $8? What happens to concession revenue if the theater increases ticket prices? If the theater wants to maximize the sum of ticket and concession revenue, should they raise ticket prices to $9?

Answer: The price elasticity of demand at $8 is $E = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right) = \left(\frac{8}{300}\right)\left(\frac{-30}{1}\right) = -0.8$.

Initially, ticket revenue is $P^*Q = \$8(300) = \$2{,}400$. If ticket prices are raised to $9, ticket revenue becomes $P^*Q = \$9(270) = \$2{,}430$. Thus, if ticket prices are raised to $9, ticket revenue increases by $30. At $8, the concession stand will average $1,500 per movie showing. If ticket prices are raised to $9, the concession stand will average $1,350. Thus, concession stand revenues will fall on average by $150. If the theater wants to maximize the sum of ticket and concession revenue, they should not raise ticket prices to $9.

Diff: 3
Section: 2.7

Chapter 3 Consumer Behavior

1) Gary Franklin is a movie critic. He invented the Franklin Scale with which he rates movies from 1 to 10 (10 being best). When asked about his scale, Mr. Franklin explained "that it is a subjective measure of movie quality. A movie with a ranking of 10 is not necessarily 10 times better than a movie with a ranking of 1, but it is better. A movie with a ranking of 5 is better than a movie with a ranking of 1, but is not as good a movie with a ranking of 10. That's all it really tells you." Based on Mr. Franklin's description, his scale is:
   A) ordinal but not cardinal.
   B) cardinal but not ordinal.
   C) an objective standard to judge movies.
   D) neither cardinal nor ordinal.

   Answer: A
   Diff: 1
   Section: 3.1

2) Which of the following is NOT an assumption regarding people's preferences in the theory of consumer behavior?
   A) Preferences are complete.
   B) Preferences are transitive.
   C) Consumers prefer more of a good to less.
   D) All of the above are basic assumptions about consumer preferences.

   Answer: D
   Diff: 1
   Section: 3.1

3) The theory of consumer behavior is based on certain assumptions. The set of four basic assumptions includes:
   A) completeness.
   B) transitivity.
   C) intransitivity.
   D) Both A and B are correct.
   E) Both A and C are correct.

   Answer: D
   Diff: 1
   Section: 3.1

4) The assumption of transitive preferences implies that indifference curves must:
   A) not cross one another.
   B) have a positive slope.
   C) be L–shaped.
   D) be convex to the origin.
   E) all of the above

   Answer: A
   Diff: 1
   Section: 3.1

5) If a market basket is changed by adding more of at least one good, then rational consumers will:
   A) rank the market basket more highly after the change.
   B) more likely prefer a different market basket.
   C) rank the market basket as being just as desirable as before.
   D) be unable to decide whether the first market basket is preferred to the second or vice versa.
   E) have indifference curves that cross.

Answer: A
Diff: 1
Section: 3.1

6) A consumer prefers market basket A to market basket B, and prefers market basket B to market basket C. Therefore, A is preferred to C. The assumption that leads to this conclusion is:
   A) transitivity.
   B) completeness.
   C) all goods are good.
   D) diminishing MRS.
   E) assumption of rationality.

Answer: A
Diff: 1
Section: 3.1

7) The assumption that preferences are complete:
   A) means that a consumer will spend her entire income.
   B) is unnecessary, as long as transitivity is assumed.
   C) recognizes that there may be pairs of market baskets that cannot be compared.
   D) means that the consumer can compare any two market baskets of goods and determine that either one is preferred to the other or that she is indifferent between them.

Answer: D
Diff: 1
Section: 3.1

8) A curve that represents all combinations of market baskets that provide the same level of utility to a consumer is called:
   A) a budget line.
   B) an isoquant.
   C) an indifference curve.
   D) a demand curve.
   E) none of the above

Answer: C
Diff: 1
Section: 3.1

9) An upward sloping indifference curve defined over two goods violates which of the following assumptions from the theory of consumer behavior?
   A) transitivity.
   B) preferences are complete.
   C) more is preferred to less.
   D) all of the above
   E) none of the above

Answer: C
Diff: 1
Section: 3.1

10) The slope of an indifference curve reveals:
   A) that preferences are complete.
   B) the marginal rate of substitution of one good for another good.
   C) the ratio of market prices.
   D) that preferences are transitive.
   E) none of the above

Answer: B
Diff: 1
Section: 3.1

11) Zoe is an executive at Dell Computer Company who is in charge of designing the next version of laptop computers. She will consider such features as screen size, weight, processor speed, and CD and DVD drives. Given the fact that it is costly to include more features in new products, why might Zoe be interested in data on how much consumers paid for a range of laptops with different attributes?
   A) in order to estimate willingness to pay for each feature.
   B) in order to set an optimal price for the laptops.
   C) in order to determine the best features to include.
   D) in order to estimate willingness to trade off one feature for another.
   E) all of the above

Answer: D
Diff: 2
Section: 3.1

12) In what ways can economists help auto manufacturers estimate the marginal rate of substitution between features such as vehicle interior size and acceleration?
   A) Examining production cost data
   B) Conducting consumer surveys about willingness to pay for auto features
   C) Solving the standard consumer model
   D) Statistically analyzing historical data on purchases of different types of autos
   E) B and D only

Answer: E
Diff: 1
Section: 3.1

13) Indifference curves are convex to the origin because of:
A) transitivity of consumer preferences.
B) the assumption of a diminishing marginal rate of substitution.
C) the assumption that more is preferred to less.
D) the assumption of completeness.
E) none of the above

Answer: B
Diff: 1
Section: 3.1

14) Suppose that a market basket of two goods is changed by adding more of one of the goods and subtracting one unit of the other. The consumer will:
A) rank the market basket more highly after the change.
B) rank the market basket more highly before the change.
C) rank the market basket just as desirable as before.
D) any one of the above statements may be true.

Answer: D
Diff: 1
Section: 3.1

15) If indifference curves cross, then:
A) the assumption of a diminishing marginal rate of substitution is violated.
B) the assumption of transitivity is violated.
C) the assumption of completeness is violated.
D) consumers minimize their satisfaction.
E) all of the above

Answer: B
Diff: 1
Section: 3.1

Alvin's preferences for good X and good Y are shown in the diagram below.

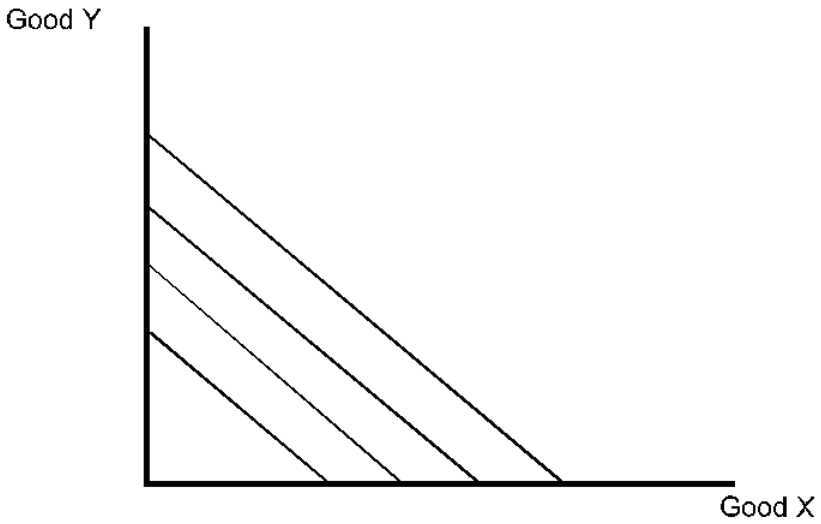


Figure 3.1

16) Based on Figure 3.1, it can be inferred that:
A) Alvin does not consider good X as "good."
B) Alvin will never purchase any of good Y.
C) Alvin regards good X and good Y as perfect substitutes.
D) Alvin regards good X and good Y as perfect complements.
E) none of the above

Answer: C
Diff: 1
Section: 3.1

17) Refer to Figure 3.1. Which of the following is true concerning Alvin's marginal rate of substitution?
A) It is diminishing.
B) It is positive but varies along the indifference curve.
C) It is constant.
D) It is zero.

Answer: C
Diff: 1
Section: 3.1

18) Refer to Figure 3.1. Which assumption concerning preferences do Alvin's indifference curves violate?
A) Diminishing marginal rates of substitution
B) Transitivity of preferences
C) More is preferred to less
D) Completeness

Answer: A
Diff: 1
Section: 3.1

Alvin's preferences for good X and good Y are shown in the diagram below.

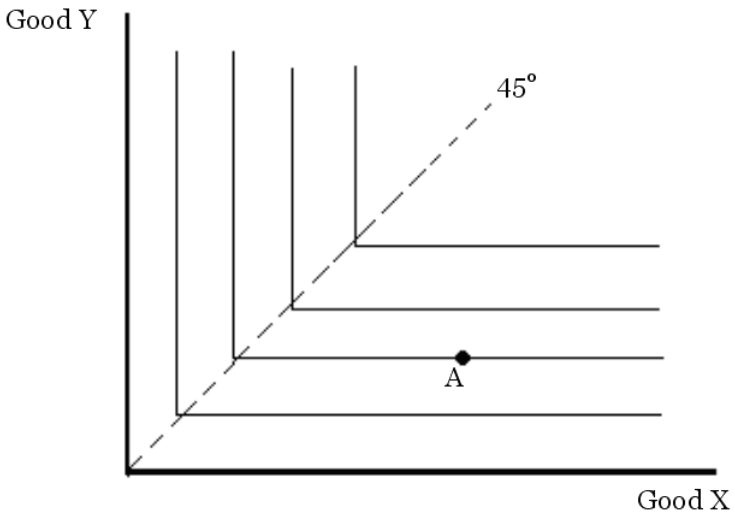


Figure 3.2

19) Based on Figure 3.2, it can be inferred that:
A) Alvin does not consider good X as "good."
B) Alvin will never purchase any of good Y.
C) Alvin regards good X and good Y as perfect substitutes.
D) Alvin regards good X and good Y as perfect complements.
E) none of the above

Answer: D
Diff: 1
Section: 3.1

20) Refer to Figure 3.2. At any consumption bundle with the quantity of good X exceeding the quantity of good Y (that is, a bundle located below the 45 degree line, like point A), Alvin's marginal rate of substitution of good X for good Y is
A) diminishing.
B) positive.
C) constant and positive.
D) zero.

Answer: D
Diff: 1
Section: 3.1

21) Refer to Figure 3.2. Which assumption concerning preferences do Alvin's indifference curves violate?
A) Diminishing marginal rates of substitution
B) Transitivity of preferences
C) More is preferred to less
D) Completeness
E) both A and C

Answer: E
Diff: 1
Section: 3.1

22) Which of the following is true about the indifference curve where one commodity (such as pollution) is "bad"?
A) It has a negative slope.
B) It has a positive slope.
C) It is horizontal.
D) It is vertical.

Answer: B
Diff: 1
Section: 3.1

23) If indifference curves are concave to the origin, which assumption on preferences is violated?
A) Diminishing marginal rates of substitution
B) Transitivity of preferences
C) More is preferred to less
D) Completeness

Answer: A
Diff: 2
Section: 3.1

24) Envision a graph with meat on the horizontal axis and vegetables on the vertical axis. A strict vegetarian would have indifference curves that are:
A) vertical lines.
B) horizontal lines.
C) diagonal straight lines.
D) right angles.
E) upward sloping.

Answer: B
Diff: 2
Section: 3.1

Consider the following three market baskets:

Table 3.1

	Food	**Clothing**
A	6	3
B	8	5
C	5	8

25) Refer to Table 3.1. If preferences satisfy all four of the basic assumptions:
A) A is on the same indifference curve as B.
B) B is on the same indifference curve as C.
C) A is preferred to C.
D) B is preferred to A.
E) Both A and B answer choices are correct.

Answer: D
Diff: 2
Section: 3.1

26) Refer to Table 3.1. Which of the following cannot be true?
A) The consumer could be indifferent between A and B.
B) A and C could be on the same indifference curves.
C) The consumer could be indifferent between B and C.
D) A and C could be on different indifference curves.

Answer: A
Diff: 1
Section: 3.1

27) Consider the following three market baskets:

	Food	Clothing
A	15	18
B	13	19
C	14	17

If baskets B and C are on the same indifference curve, and if preferences satisfy all four of the basic assumptions, then:
A) A is preferred to C.
B) A is preferred to B.
C) Both A and B answer choices are correct.
D) none of the above

Answer: C
Diff: 2
Section: 3.1

28) Mikey is very picky and insists that his mom make his breakfast with equal parts of cereal and apple juice — any other combination and it ends up on the floor. Cereal costs 4 cents per tablespoon and apple juice costs 6 cents per tablespoon. If Mikey's mom budgets $8 per month for Mikey's breakfast, how much cereal and juice does she buy?
A) 40 tablespoons each of cereal and juice
B) 80 tablespoons each of cereal and juice
C) 40 tablespoons of cereal and 75 tablespoons of juice
D) 100 tablespoons of cereal and 67 tablespoons of juice

Answer: B
Diff: 2
Section: 3.1

29) Jane is trying to decide which courses to take next semester. She has narrowed down her choice to two courses, Econ 1 and Econ 2. Now she is having trouble and cannot decide which of the two courses to take. It's not that she is indifferent between the two courses, she just cannot decide. An economist would say that this is an example of preferences that:
A) are not transitive.
B) are incomplete.
C) violate the assumption that more is preferred to less.
D) all of the above

Answer: B
Diff: 2
Section: 3.1

30) Which of the following are examples of situations in which the standard model of the consumer may not be realistic?
A) Impulse purchases
B) Following fads and fashions instead of one's own preferences
C) Addictions or other strong habits in consumption
D) all of the above

Answer: D
Diff: 2
Section: 3.1

31) What is a good argument for using the model of the consumer despite the fact that it requires making many simplifying assumptions?
A) It is complex to solve.
B) The assumptions are sometimes realistic.
C) It explains observed patterns of behavior.
D) It is used in many scholarly fields.

Answer: C
Diff: 1
Section: 3.1

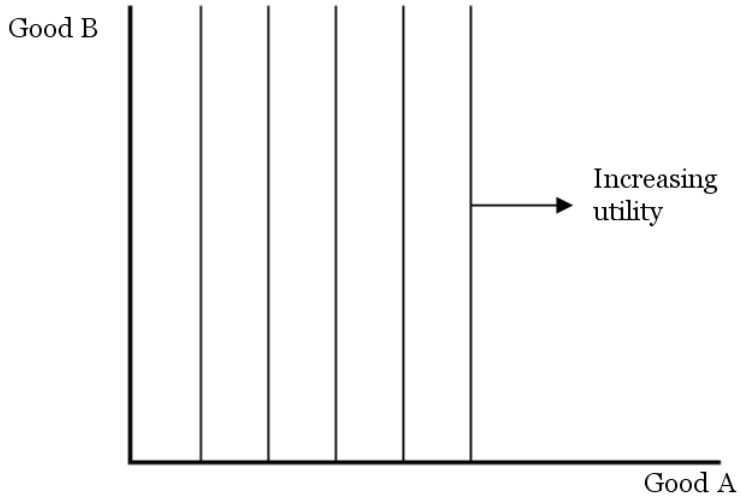


Figure 3.3

32) Refer to the indifference curve in Figure 3.3. Which of the following statements is correct?
A) This individual receives no satisfaction from Good A.
B) This individual receives no satisfaction from Good B.
C) This individual will only consume A and B in fixed proportions.
D) none of the above

Answer: B
Diff: 2
Section: 3.1

33) Refer to the indifference curve in Figure 3.3. Which of the following statements is correct?
A) MU(A) = 0.
B) MU(B) = 0.
C) MU(A) is negative.
D) MU(B) is negative.

Answer: B
Diff: 1
Section: 3.1

34) Refer to the indifference curve in Figure 3.3. Which of the following is true about the MRS?
A) It is negative.
B) It is positive.
C) It is equal to zero.
D) It is undefined.

Answer: D
Diff: 1
Section: 3.1

35) The magnitude of the slope of an indifference curve is:
A) called the marginal rate of substitution.
B) equal to the ratio of the total utility of the goods.
C) always equal to the ratio of the prices of the goods.
D) all of the above
E) A and C only

Answer: A
Diff: 3
Section: 3.1

36) Use the following two statements to answer this question:
I. If utility is ordinal, a market basket that provides 30 utils provides twice the satisfaction of a market basket that provides 15 utils.
II. When economists first studied utility it was believed that utility was cardinal, but it was later discovered that ordinal preferences are sufficient to explain how most individual decisions are made.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: C
Diff: 2
Section: 3.1

37) If X and Y are perfect substitutes, which of the following assumptions about indifference curves is not satisfied?
A) Completeness
B) Transitivity
C) More is preferred to less
D) Diminishing MRS
E) none of the above (All of the above assumptions are satisfied.)

Answer: D
Diff: 2
Section: 3.1

38) If a consumer is always indifferent between an additional one grapefruit or an additional two oranges, then when oranges are on the horizontal axis the indifference curves:
A) will be straight lines with a slope of –1/2.
B) will be straight lines with a slope of –1.
C) will be straight lines with a slope of +1/2.
D) will be right angles whose corners occur on a ray from the origin with a slope of +2.
E) none of the above

Answer: A
Diff: 3
Section: 3.1

39) Consider the following three market baskets:

	Cheese	**Crackers**
A	5	8
B	15	6
C	10	7

If baskets A and B are on the same indifference curve and if indifference curves exhibit diminishing MRS:
A) C is preferred to both A and B.
B) A and B are both preferred to C.
C) C is on the same indifference curve as A and B.
D) There is not enough information to determine preferences for C relative to the other goods.

Answer: A
Diff: 3
Section: 3.1

40) Use the following two statements to answer this question:
I. According to the three basic assumptions regarding people's preferences, a person will always prefer to earn a living through honest work rather than a life of crime.
II. When we say that preferences are complete, we mean that if a consumer prefers market basket A to market basket B, and prefers market basket B to market basket C, then the consumer prefers market basket A to market basket C.
A) Both I and II are true.
B) I is true and II is false.
C) I is false and II is true.
D) Both I and II are false.

Answer: D
Diff: 3
Section: 3.1

41) Use the following two statements to answer this question:

I. Consumer theory can determine whether giving an individual a more preferred basket of goods doubles her overall level of satisfaction, less than doubles her satisfaction, or more than doubles her satisfaction.

II. There is not much empirical evidence to support the assumption that higher incomes result in higher levels of satisfaction.

A) Both I and II are true.
B) I is true and II is false.
C) I is false and II is true.
D) Both I and II are false.

Answer: D
Diff: 3
Section: 3.1

42) Which of the following statements concerning utility as a measure for well being are false?

A) There is generally a positive relationship between income and utility.
B) It is possible to determine which of two individuals is made happier by consuming a particular market basket.
C) Utility is an abstract representation of an individual's degree of happiness.
D) Cross country studies suggest that citizens in wealthier countries are happier than citizens in poorer countries.

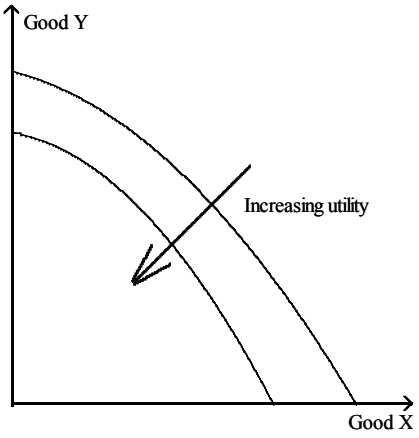
Answer: B
Diff: 2
Section: 3.1

43) If Jill's MRS of popcorn for candy is 2 (popcorn is on the horizontal axis), Jill would willingly give up:

A) 2, but no more than 2, units of popcorn for an additional unit of candy.
B) 2, but no more than 2, units of candy for an additional unit of popcorn.
C) 1, but no more than 1, unit of candy for an additional 2 units of popcorn.
D) 2, but no more than 2, units of popcorn for an additional 2 units of candy.

Answer: B
Diff: 2
Section: 3.1

44) Consider the indifference map in the figure below:



Which of the four basic assumptions about consumer preferences are violated by this indifference map?

A) More is better than less
B) Transitivity
C) Diminishing MRS
D) A and B are correct.
E) A and C are correct.

Answer: E
Diff: 2
Section: 3.1

45) A consumer has $100 per day to spend on product A, which has a unit price of $7, and product B, which has a unit price of $15. What is the slope of the budget line if good A is on the horizontal axis and good B is on the vertical axis?

A) –7/15 B) –7/100 C) –15/7 D) 7/15

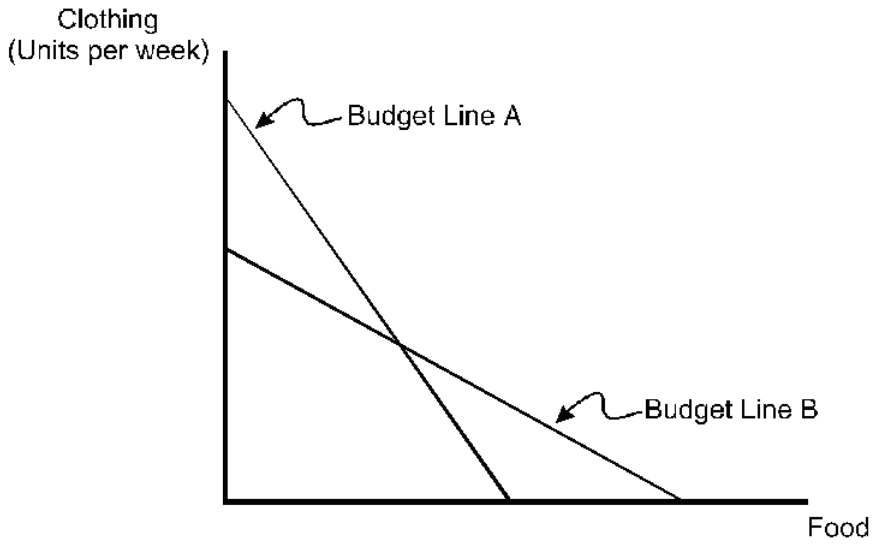
Answer: A
Diff: 1
Section: 3.2

46) Suppose that the prices of good A and good B were to suddenly double. If good A is plotted along the horizontal axis,

A) the budget line will become steeper.
B) the budget line will become flatter.
C) the slope of the budget line will not change.
D) the slope of the budget line will change, but in an indeterminate way.

Answer: C
Diff: 1
Section: 3.2

47) Theodore's budget line has changed from A to B. Which of the following explains the change in Theodore's budget line?



A) The price of food and the price of clothing increased.
B) The price of food increased, and the price of clothing decreased.
C) The price of food decreased, and the price of clothing increased.
D) The price of food and the price of clothing decreased.
E) none of the above

Answer: C
Diff: 1
Section: 3.2

48) If the quantity of good A (Q_A) is plotted along the horizontal axis, the quantity of good B (Q_B) is plotted along the vertical axis, the price of good A is P_A, the price of good B is P_B and the consumer's income is I, then the slope of the consumer's budget constraint is _____.

A) –Qa/Qb
B) –Qb/Qa
C) –Pa/Pb
D) –Pb/Pa
E) I/Pa or I/Pb

Answer: C
Diff: 2
Section: 3.2

49) The endpoints (horizontal and vertical intercepts) of the budget line:
A) measure its slope.
B) measure the rate at which one good can be substituted for another.
C) measure the rate at which a consumer is willing to trade one good for another.
D) represent the quantity of each good that could be purchased if all of the budget were allocated to that good.
E) indicate the highest level of satisfaction the consumer can achieve.

Answer: D
Diff: 1
Section: 3.2

50) An increase in income, holding prices constant, can be represented as:
A) a change in the slope of the budget line.
B) a parallel outward shift in the budget line.
C) an outward shift in the budget line with its slope becoming flatter.
D) a parallel inward shift in the budget line.

Answer: B
Diff: 1
Section: 3.2

51) Assume that food is measured on the horizontal axis and clothing on the vertical axis. If the price of food falls relative to that of clothing, the budget line will:
A) become flatter.
B) become steeper.
C) shift outward.
D) become steeper or flatter depending on the relationship between prices and income.

Answer: A
Diff: 1
Section: 3.2

52) Which of the following will result in a decrease in a consumer's purchasing power?
A) A decrease in the consumer's income
B) An increase in the price of the good on the vertical axis
C) An increase in the price of the good on the horizontal axis
D) all of the above

Answer: D
Diff: 1
Section: 3.2

53) If prices and income in a two-good society double, what will happen to the budget line?
A) The intercepts of the budget line will increase.
B) The intercepts of the budget line will decrease.
C) The slope of the budget line may either increase or decrease.
D) Insufficient information is given to determine what effect the change will have on the budget line but we know society is worse-off.
E) There will be no effect on the budget line.

Answer: E
Diff: 2
Section: 3.2

54) The budget constraint for a consumer who only buys apples (A) and bananas (B) is $P_A A + P_B B = I$ where consumer income is I, the price of apples is P_A, and the price of bananas is P_B. To plot this budget constraint in a figure with apples on the horizontal axis, we should use a budget line represented by the slope–intercept equation:

A) $A = -I/P_A + (P_B/P_A)B$ B) $A = I/P_A - (P_B/P_A)B$

C) $B = -I/P_B + (P_A/P_B)A$ D) $B = I/P_B - (P_A/P_B)A$

Answer: D
Diff: 2
Section: 3.2

55) Suppose a consumer only purchases food and clothing, and food is plotted along the horizontal axis of the consumer's indifference map. If the price of clothing increases and the price of food and income do not change, then the budget line changes by rotating:

A) counter–clockwise about the fixed vertical axis intercept.
B) clockwise about the fixed vertical axis intercept.
C) counter–clockwise about the fixed horizontal axis intercept.
D) clockwise about the fixed horizontal axis intercept.
E) none of the above

Answer: C
Diff: 1
Section: 3.2

56) Suppose a consumer only purchases food and clothing, and food is plotted along the horizontal axis of the consumer's indifference map. If the price of food and clothing increase and income does not change, then the budget line changes by rotating:

A) counter–clockwise about the fixed vertical axis intercept.
B) clockwise about the fixed vertical axis intercept.
C) counter–clockwise about the fixed horizontal axis intercept.
D) clockwise about the fixed horizontal axis intercept.
E) none of the above

Answer: E
Diff: 1
Section: 3.2

57) To simplify our consumption models, suppose U.S. consumers only purchase food and all other goods where food is plotted along the horizontal axis of the indifference map. If the U.S. Congress passes an economic stimulus package that pays $300 to each person, how does this affect the budget line for each consumer?

A) Makes the budget line steeper
B) Makes the budget line flatter
C) Parallel rightward shift
D) Parallel leftward shift
E) none of the above

Answer: C
Diff: 1
Section: 3.2

58) To simplify our consumption models, suppose U.S. consumers only purchase food and all other goods where food is plotted along the horizontal axis of the indifference map. Also, suppose that all states initially impose state sales taxes on all goods (including food), but then the states exempt food from the state sales tax. How does this tax policy change alter the consumer's budget line?
A) Makes the budget line steeper
B) Makes the budget line flatter
C) Parallel rightward shift
D) Parallel leftward shift
E) none of the above

Answer: B
Diff: 1
Section: 3.2

59) A consumer maximizes satisfaction at the point where his valuation of good X, measured as the amount of good Y he would willingly give up to obtain an additional unit of X, equals:
A) the magnitude of the slope of the indifference curve through that point.
B) one over the magnitude of the slope of the indifference curve through that point.
C) Px/Py
D) Py/Px

Answer: C
Diff: 2
Section: 3.3

60) Which of the following statements is true about a consumer's optimal decision when indifference curves are concave?
A) Both goods are consumed.
B) No goods are consumed.
C) Only one of the goods is consumed.
D) It occurs at the point of tangency with the budget line.

Answer: C
Diff: 3
Section: 3.3

61) Pencils sell for 10 cents and pens sell for 50 cents. Suppose Jack, whose preferences satisfy all of the basic assumptions, buys 5 pens and one pencil each semester. With this consumption bundle, his MRS of pencils for pens is 3. Which of the following is true?
A) Jack could increase his utility by buying more pens and fewer pencils.
B) Jack could increase his utility by buying more pencils and fewer pens.
C) Jack could increase his utility by buying more pencils and more pens.
D) Jack could increase his utility by buying fewer pencils and fewer pens.
E) Jack is at a corner solution and is maximizing his utility.

Answer: B
Diff: 2
Section: 3.3

62) An individual consumes only two goods, X and Y. Which of the following expressions represents the utility maximizing market basket?
A) MRSxy is at a maximum.
B) Px/Py = money income.
C) MRSxy = money income.
D) MRSxy = Px/Py.
E) all of the above

Answer: D
Diff: 2
Section: 3.3

63) The fact that Alice spends no money on travel:
A) implies that she does not derive any satisfaction from travel.
B) implies that she is at a corner solution.
C) implies that her MRS does not equal the price ratio.
D) any of the above are possible.

Answer: D
Diff: 3
Section: 3.3

64) The price of lemonade is $0.50; the price of popcorn is $1.00. If Fred has maximized his utility by purchasing lemonade and popcorn, his marginal rate of substitution will be:
A) 2 lemonades for each popcorn.
B) 1 lemonades for each popcorn.
C) 1/2 lemonade for each popcorn.
D) indeterminate unless more information on Fred's marginal utilities is provided.

Answer: A
Diff: 2
Section: 3.3

65) When Joe maximizes utility, he finds that his MRS of X for Y is greater than Px/Py. It is most likely that:
A) Joe's preferences are incomplete.
B) Joe's preferences are irrational.
C) Joe is not consuming good X.
D) Joe is not consuming good Y.

Answer: D
Diff: 3
Section: 3.3

66) Bob views apples and oranges as perfect substitutes in his consumption, and MRS = 1 for all combinations of the two goods in his indifference map. Suppose the price of apples is $2 per pound, the price of oranges is $3 per pound, and Bob's budget is $30 per week. What is Bob's utility maximizing choice between these two goods?
A) 4 pounds of apples and 6 pounds of oranges
B) 5 pounds of apples and 5 pounds of oranges
C) 10 pounds of oranges and no apples
D) 15 pounds of apples and no oranges
E) none of the above

Answer: D
Diff: 2
Section: 3.3

67) Sue views hot dogs and hot dog buns as perfect complements in her consumption, and the corners of her indifference curves follow the 45-degree line. Suppose the price of hot dogs is $5 per package (8 hot dogs), the price of buns is $3 per package (8 hot dog buns), and Sue's budget is $48 per month. What is her optimal choice under this scenario?

A) 8 packages of hot dogs and 6 packages of buns
B) 8 packages of hot dogs and 8 packages of buns
C) 6 packages of hot dogs and 6 packages of buns
D) 6 packages of hot dogs and 8 packages of buns

Answer: C
Diff: 2
Section: 3.3

68) Sue views hot dogs and hot dog buns as perfect complements in her consumption, and the corners of her indifference curves follow the 45-degree line. Initially, the price of hot dogs is $3 per package (8 hot dogs), the price of buns is $3 per package (8 hot dog buns), and Sue's budget is $48 per month. How does her optimal consumption bundle change if the price of hot dog buns increases to $5 per package?

A) Sue does not change her consumption because these goods are perfect complements.
B) She buys the same amount of hot dog buns and buys more hot dogs.
C) She buys the same amount of hot dogs and buys two less packages of hot dog buns.
D) She reduces her consumption by 2 packages of hot dogs and 2 packages of hot dog buns.

Answer: D
Diff: 2
Section: 3.3

69) The principle of revealed preference would say that if Xavier chooses market basket A over market basket B then:

A) if A is more expensive than B, then Xavier must prefer A over B.
B) if A is more expensive than B, then Xavier must prefer B over A.
C) if A is less expensive than B, then Xavier must prefer A over B.
D) if A is less expensive than B, then Xavier must prefer B over A.

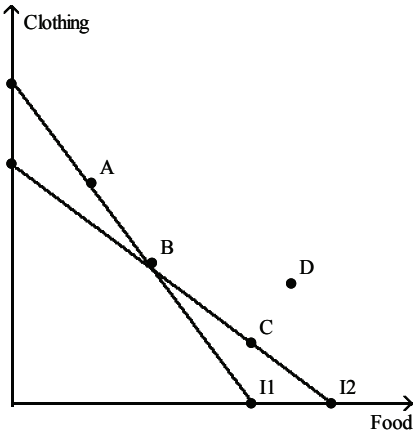
Answer: A
Diff: 2
Section: 3.4

70) Denise is shopping for lobsters and eclairs. When she faces budget line $b1$, she chooses market basket A over market basket B. When she faces budget line $b2$, she chooses basket B over basket C. Which assumption of consumer theory helps us determine Denise's preference ordering over basket A and basket C?

A) Completeness
B) More is better than less
C) Transitivity
D) Convexity

Answer: C
Diff: 1
Section: 3.4

71) Please consider the following figure:

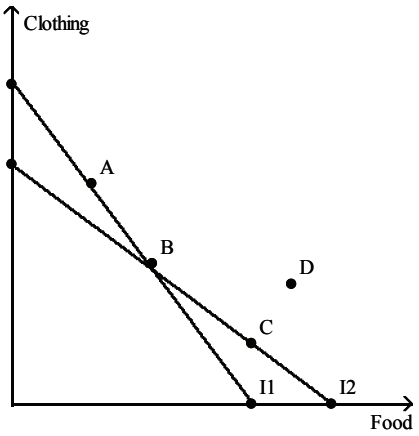


The consumer chooses A on budget line I1 and B on budget line I2. Which of the following statements is NOT true?

A) A is preferred to B.
B) B is preferred to C.
C) C is preferred to D.
D) A is preferred to C.

Answer: C
Diff: 1
Section: 3.4

72) Please consider the following figure:

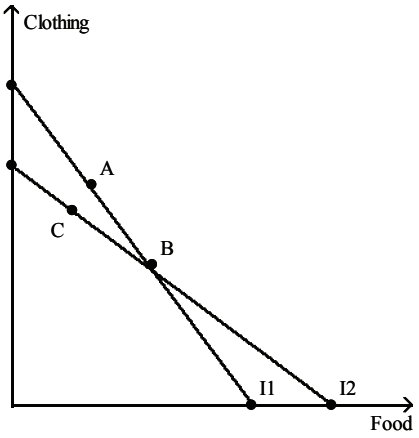


The consumer chooses A on budget line I1 and B on budget line I2. Which of the following rankings describes the consumer's preferences (first is highest ranked and last is lowest ranked)?

A) A–B–C–D
B) A–D–B–C
C) A–B–D–C
D) We do not have enough information to rank all four bundles.

Answer: D
Diff: 2
Section: 3.4

73) Please consider the following figure:



The consumer chooses A on budget line I1 and B on budget line I2. Which of the following statements is NOT true?

A) B is preferred to C.
B) A is preferred to B.
C) C is preferred to A.
D) All of the statements are correct.

Answer: C
Diff: 1
Section: 3.4

74) If a consumer must spend her entire income on some combination of two commodities and chooses to spend it all on just one of the commodities then:

A) the other commodity is an economic bad.
B) the other commodity must have zero marginal utility.
C) the other commodity generates less utility per dollar spent on the good.
D) the two commodities must be perfect substitutes.

Answer: C
Diff: 3
Section: 3.5

75) Marginal utility measures:

A) the slope of the indifference curve.
B) the additional satisfaction from consuming one more unit of a good.
C) the slope of the budget line.
D) the marginal rate of substitution.
E) none of the above

Answer: B
Diff: 1
Section: 3.5

76) Oscar consumes only two goods, X and Y. Assume that Oscar is not at a corner solution, but he is maximizing utility. Which of the following is NOT necessarily true?
A) MRSxy = Px/Py.
B) MUx/MUy = Px/Py.
C) Px/Py = money income.
D) Px/Py = slope of the indifference curve at the optimal choice.
E) MUx/Px = MUy/Py.

Answer: C
Diff: 2
Section: 3.5

Scenario 3.1:
Andy derives utility from two goods, potato chips (Qp) and Cola (Qc). Andy receives zero utility unless he consumes some of at least one good. The marginal utility that he receives from the two goods is given as follows:

Qp	MUp	Qc	MUc
1	12	1	24
2	10	2	22
3	8	3	20
4	6	4	18
5	4	5	16
6	2	6	14
7	–2	7	12
8	–4	8	10

77) Refer to Scenario 3.1. What is the total utility that Andy will receive if he consumes 5 units of potato chips (Qp) and no Cola drink (Qc)?
A) 4 utils
B) 10 utils
C) 30 utils
D) 40 utils
E) none of the above

Answer: D
Diff: 1
Section: 3.5

78) Refer to Scenario 3.1. If the price of potato chips is $0.50 and the price of Cola is $4.00, and Andy has an unlimited income, how many units of potato chips will he consume?
A) 5
B) 6
C) 7
D) 8
E) none of the above

Answer: B
Diff: 2
Section: 3.5

79) Refer to Scenario 3.1. If the price of potato chips is $0.50 and the price of Cola is $4.00, and Andy has an income of $14.50, how many units of potato chips will he consume?
A) 5
B) 6
C) 7
D) 8
E) none of the above

Answer: A
Diff: 3
Section: 3.5

80) When a person consumes two goods (A and B), that person's utility is maximized when the budget is allocated such that:
A) the marginal utility of A equals the marginal utility of B.
B) the marginal utility of A times the price of A equals the marginal utility of B times the price of B
C) the ratio of total utility of A to the price of A equals the ratio of the marginal utility of B to the price of A.
D) the ratio of the marginal utility of A to the price of A equals the ratio of the marginal utility of B to the price of B.

Answer: D
Diff: 2
Section: 3.5

81) If Px = Py, then when the consumer maximizes utility,
A) X must equal Y.
B) MU(X) must equal MU(Y).
C) MU(X) may equal MU(Y), but it is not necessarily so.
D) X and Y must be substitutes.

Answer: B
Diff: 2
Section: 3.5

82) Monica consumes only goods A and B. Suppose that her marginal utility from consuming good A is equal to 1/Qa, and her marginal utility from consuming good B is 1/Qb. If the price of A is $0.50, the price of B is $4.00, and the Monica's income is $120.00, how much of good A will she purchase?
A) 0 B) 12 C) 24 D) 48 E) 120

Answer: E
Diff: 2
Section: 3.5

83) Jane is attempting to maximize utility by selecting a market basket of goods. For each of the goods in the market basket the marginal utility per dollar spent is equal. There are some goods which are affordable but do not appear in the Jane's market basket. If Jane has maximized utility, the marginal utility per dollar spent on each of the goods that does not appear in the market basket is:
A) too high.
B) too low.
C) zero.
D) infinite.
E) none of the above

Answer: B
Diff: 2
Section: 3.5

84) Alfred derives utility from consuming iced tea and lemonade. For the bundle he currently consumes, the marginal utility he receives from iced tea is 16 utils, and the marginal utility he receives from lemonade is 8 utils. Instead of consuming this bundle, Alfred should:
A) buy more iced tea and less lemonade.
B) buy more lemonade and less iced tea.
C) buy more iced tea and lemonade.
D) buy less iced tea and lemonade.
E) none of the above is necessarily correct.

Answer: E
Diff: 3
Section: 3.5

85) A team of researchers has conducted a study of the well being of the citizens of the island nation of Zarasa. Using a scale from 1 (least happy) to 10 (most happy), the researchers find that citizens who earn 100 Zarutas per year have a mean happiness of 2.0, those who earn 200 Zarutas per year have a mean happiness of 6.0, and those who earn 300 Zarutas per year have a mean happiness of 7.0. The researchers should make which of the following conclusions?
A) The utility of Zarasians increases with income.
B) The marginal utility of Zarasians increases with income.
C) The marginal utility of Zarasians decreases with income.
D) both A and B
E) both A and C

Answer: E
Diff: 2
Section: 3.5

86) Bill currently uses his entire budget to purchase 5 cans of Pepsi and 3 hamburgers per week. The price of Pepsi is $1 per can, the price of a hamburger is $2, Bill's marginal utility from Pepsi is 4, and his marginal utility from hamburgers is 6. Bill could increase his utility by:
A) increasing Pepsi consumption and reducing hamburger consumption.
B) increasing hamburger consumption and reducing Pepsi consumption.
C) maintaining his current consumption choices.
D) We do not have enough information to answer this question.

Answer: A
Diff: 2
Section: 3.5

87) Bill uses his entire budget to purchase Pepsi and hamburgers, and he currently purchases no Pepsi and 6 hamburgers per week. The price of Pepsi is $1 per can, the price of a hamburger is $2, Bill's marginal utility from Pepsi is 2, and his marginal utility from hamburgers is 6. Is Bill's current consumption decision optimal?

A) No, he should increase Pepsi consumption and reduce hamburger consumption.
B) No, he should purchase more of both goods.
C) Yes, the corner solution is best because his MRS is less than the price ratio.
D) We do not have enough information to answer this question.

Answer: C
Diff: 2
Section: 3.5

88) Use the following statements to answer this question:

I. The equal marginal principle may be used to characterize the maximum utility consumption decision even if the diminishing MRS assumption does not hold.

II. The equal marginal principle implies that the MRS at the optimal consumption bundle is always equal to the price ratio.

A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: D
Diff: 1
Section: 3.5

89) An ideal cost–of–living index measures:

A) The relative cost of maintaining a particular utility level.
B) The relative changes in consumer satisfaction that arise from price increases.
C) The relative price of those goods that are considered to be necessities in consumption.
D) none of the above

Answer: A
Diff: 1
Section: 3.6

90) The Laspeyres price index tends to _____ the ideal cost–of–living index.

A) be higher than
B) be lower than
C) be equal to
D) zero faster than

Answer: A
Diff: 1
Section: 3.6

91) The key reason that the Laspeyres price index tends to overstate the impact of price changes on consumers is that it:

A) only accounts for price increases and ignore price decreases.
B) measures prices two periods after the actual price changes occurred.
C) ignores the possibility that consumers alter their consumption as prices change.
D) All of the above are correct.
E) none of the above

Answer: C
Diff: 1
Section: 3.6

92) The purpose of a chain–weighted price index is to account for:
A) the costs of purchasing wholesale products like chains and industrial goods.
B) the changes in the quantities of goods and services purchased over time.
C) linkages in price changes among industrialized countries.
D) none of the above

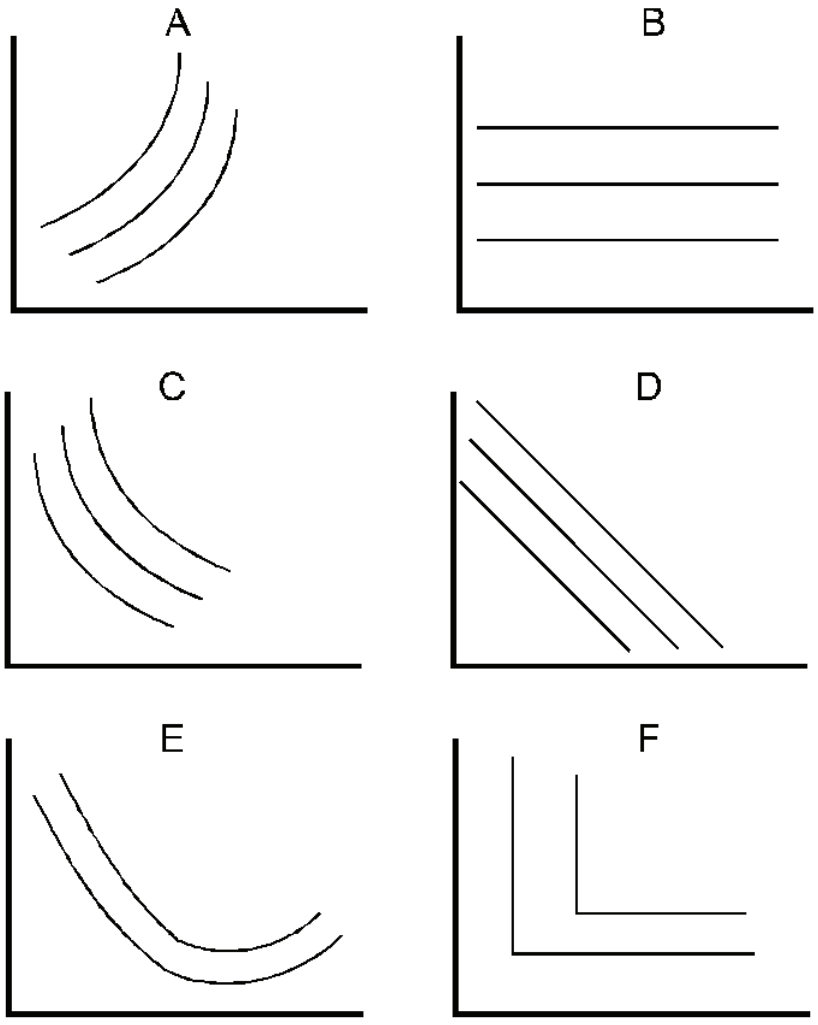
Answer: B
Diff: 1
Section: 3.6

93) Which price index tends to understate the impact of price changes on consumers?
A) Chain–weighted index
B) Laspeyres index
C) Paasche index
D) Ideal cost–of–living index

Answer: C
Diff: 1
Section: 3.6

94) Match the following descriptions of preferences to the indifference curve diagrams that follow.

_____ Ann does not care whether she has more diet soft drinks or fewer diet soft drinks.
_____ Peter is very picky about his buttered popcorn. He tops every quart of popped corn with exactly one quarter cup of melted butter.
_____ Amy likes M&M's, plain and peanut. For Amy, the marginal rate of substitution between plain and peanut M&M's does not vary with the quantities of plain and peanut M&M's she consumes.
_____ George dislikes broccoli and would be willing to pay something to not have to eat it.
_____ Natalya likes rap and rock music. Natalya's preferences exhibit a diminishing marginal rate of substitution between the two types of music.
_____ Matthew knows his limit. He likes beer up to a point, but if he drinks too much he gets sick.



Answer: B, F, D, A, C, E
Diff: 1
Section: 3.1

95) Each of the following consumers exhibit behavior that violates one of the basic assumptions of consumer preferences. Identify the assumption that is violated for each individual.

- Art says that he can watch 2 movies a week but couldn't be paid to watch another movie after that.
- Alex says that he prefers going to a movie over hiking. He also indicates that he prefers hiking to swimming. Alex then states that he would rather go swimming than go to a movie.
- Alicia says that she prefers hiking to watching a movie but can't determine her preferences for swimming.

Answer: Art violates the assumption that consumers desire more of a good to less. Alex's preferences violate transitivity. Alicia violates the completeness assumption.

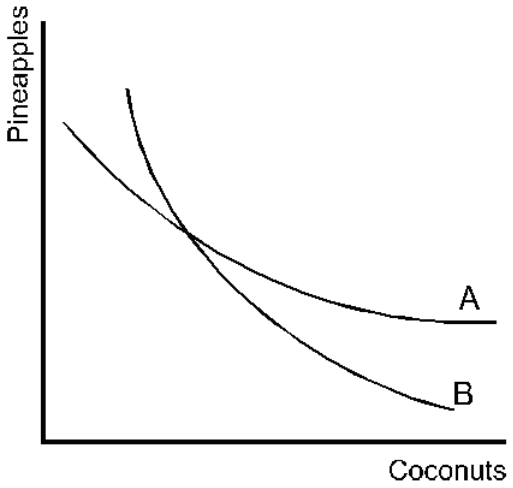
Diff: 1
Section: 3.1

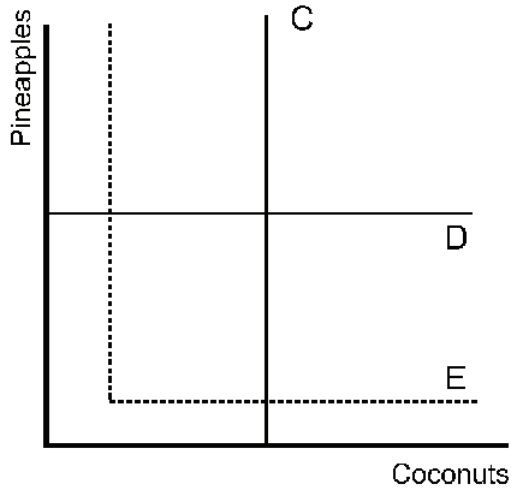
96) An island economy produces only two goods, coconuts and pineapples. There are five people (A,B, C, D, and E) living on the island with these preferences:

A has a strong preference for pineapples.
B has a strong preference for coconuts.
C doesn't care for pineapples (assigns no value to them).
D doesn't care for coconuts (assigns no value to them)
E will only consume pineapples and coconuts in the fixed proportion of one pineapple to one coconut.

For each of these five individuals, construct a representative indifference curve with pineapples on the vertical axis and coconuts on the horizontal axis. Discuss the shape of the indifference curves and relate them to the MRS.

Answer:





Individual A has relatively flat indifference curves, since A requires relatively large numbers of coconuts to compensate for the loss of pineapples that she values highly.

Individual B has relatively steep indifference curves, since B requires relatively few coconuts to compensate for the loss of pineapples that he does not value highly.

C's indifference curves are vertical; the level of satisfaction is affected only by coconuts.

D's indifference curves are horizontal; the level of satisfaction is affected only by pineapples.

E's indifference curves are L–shaped.

MRS measures (at the margin) the maximum number of pineapples that the consumer will be willing to give up in order to get one more unit of coconuts.

A's MRS is low. A is willing to relinquish few pineapples relative to coconuts since pineapples are dear to A. B's MRS is high, for the opposite reason.

C's MRS is infinite. Since C's utility is not affected by pineapples, she is willing to relinquish all pineapples (an infinite number) to obtain additional coconuts.

D's MRS is zero. D is not willing to give up any pineapples to obtain additional coconuts.

E's MRS is infinite when $Q_p > Q_c$, zero when $Q_c > Q_p$, and undefined when $Q_c = Q_p$.

Diff: 1
Section: 3.1

97) The following combinations of goods X and Y represent various market baskets. Consumption is measured in pounds per month.

Market Basket	Units of X	Units of Y
A	4	6
B	16	7
C	15	3
D	3	2

Explain which market basket(s) is(are) preferred to other(s), and if there is any uncertainty over which is preferable, point this out as well.

Answer: Since more of each good is preferred to less, we can conclude that a market basket is preferred to an alternative basket if it lies above and to the right of the alternative basket.

Combination B is preferred to all others. A and C cannot be compared without additional information. A and C are both preferred over D.

Diff: 2
Section: 3.1

98) Consider Gary's utility function: U(X,Y) = 5 XY, where X and Y are two goods. If the individual consumed 10 units of X and received 250 units of utility, how many units of Y must the individual consume? Would a market basket of X = 15 and Y = 3 be preferred to the above combination? Explain.

Answer: Given that U(X,Y) = 5XY = 5(10)Y, then 250 = 50Y, or Y = 5.

Since this individual receives 250 units of satisfaction with (X = 10, Y = 5), would (Y = 3 and X = 15) be a preferred combination? At these values, U = 5(15)(3) = 225. So, the first combination would be preferred.

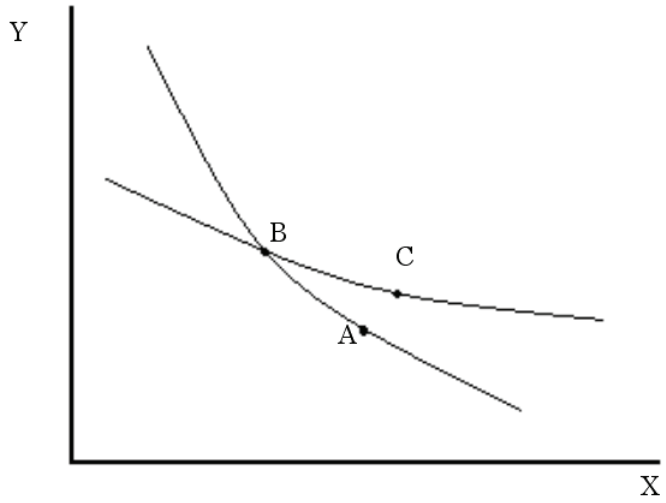
Diff: 2
Section: 3.1

99) In the theory of consumer behavior, several assumptions are made about the nature of preferences. What are these assumptions? Illustrate the significance of these assumptions using indifference curves.

Answer: Please see the text, Section 3.1.
Diff: 2
Section: 3.1

100) In the theory of consumer behavior, certain axioms about the nature of preferences imply that indifference curves cannot cross. Which axioms imply this? Explain your answer using a diagram and using words.

Answer: Transitivity and More is Better together imply that indifference curves cannot cross. If two indifference curves did cross, then by choosing three points, A, B, and C in the following way. A lies on the first indifference curve, B is the intersection point, C lies on the second curve, and A lies to the left and below point C. It is easily shown that the two axioms cannot both be satisfied. A is at least as preferred as B, and B is at least as preferred as C. By transitivity A is at least as preferred as C, contradicting More is Better. See figure below.

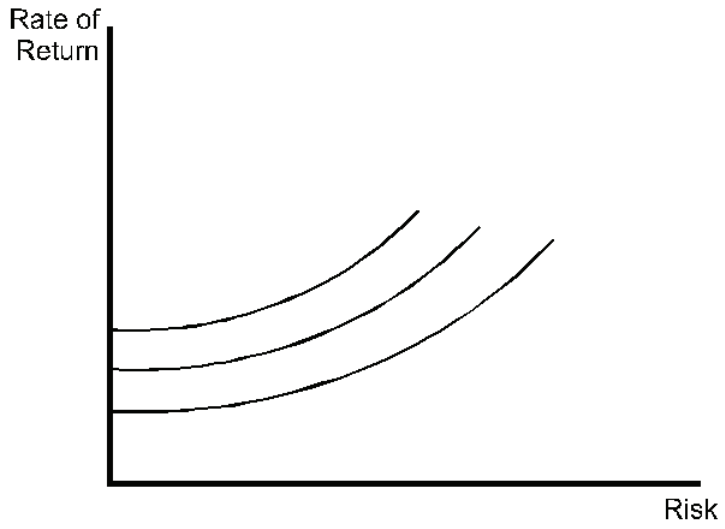


Diff: 2
Section: 3.1

101) In the field of financial management it has been observed that there is a trade-off between the rate of return that one earns on investments and the amount of risk that one must bear to earn that return.

a. Draw a set of indifference curves between risk and return for a person that is risk averse (a person that does not like risk).
b. Draw a set of indifference curves for a person that is risk neutral (a person that does not care about risk one way or the other).
c. Draw a set of indifference curves for a person that likes risk.

Answer: ***a.***



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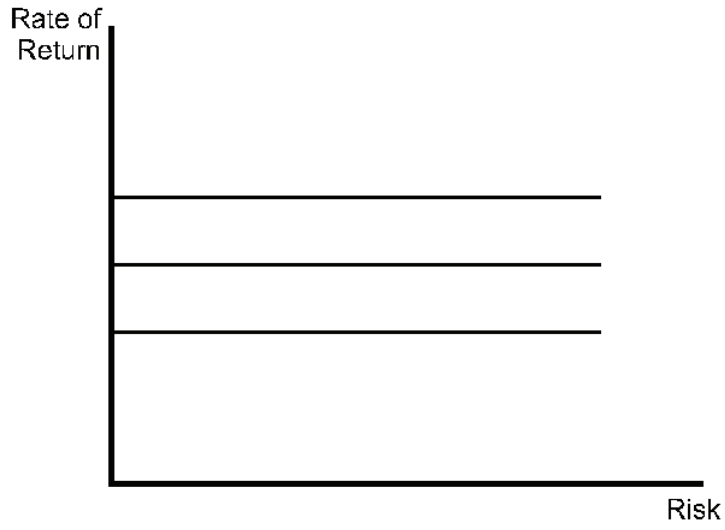

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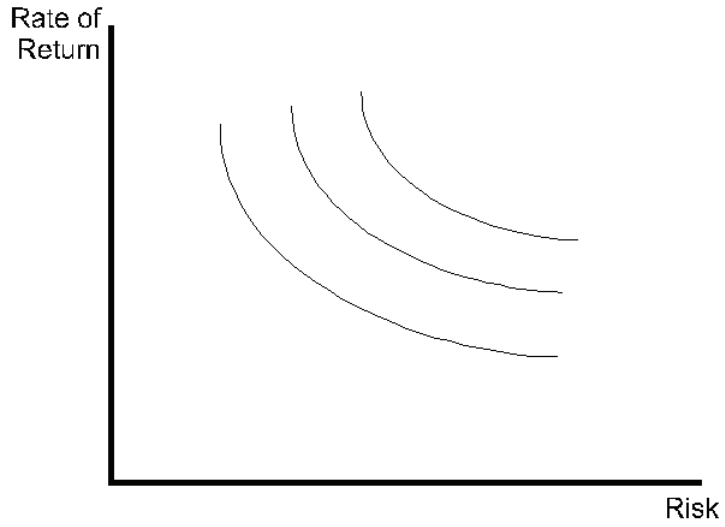


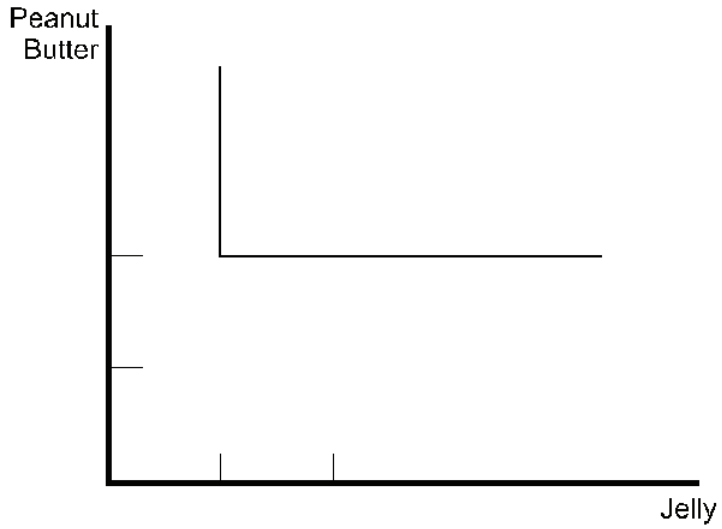
Diff: 2
Section: 3.1

102) Draw a set of indifference curves for the following pairs of goods:

a. Hamburgers and carrots for a vegetarian who neither likes nor dislikes meat. (Vegetarians do not eat meat.)
b. Peanut butter and jelly for an individual that will not eat peanut butter sandwiches or jelly sandwiches, but loves peanut butter and jelly sandwiches made with two parts peanut butter and one part jelly.
c. Tickets for Knott's Berry Farm (KBF) and Universal Studios (US) for a tourist that believes that KBF and US are perfect substitutes.
d. Ice cream and pie if these are goods that you like, but if you consume enough of either, you get sick of them. If you are sick of a good, consuming more of it lowers your utility.

Answer: ***a.***

b.



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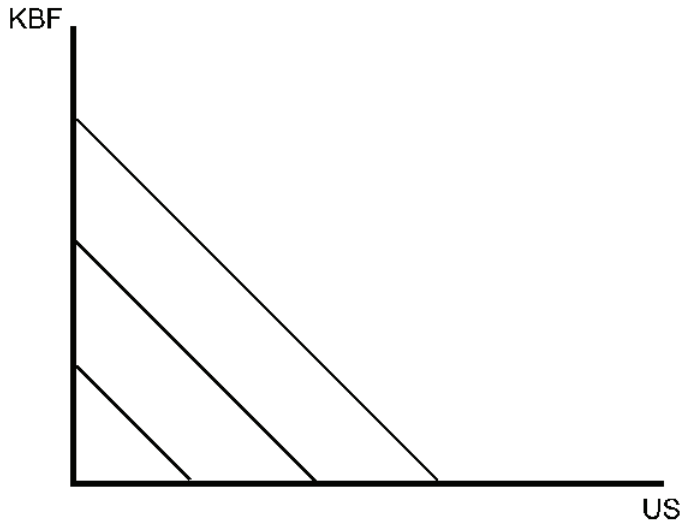

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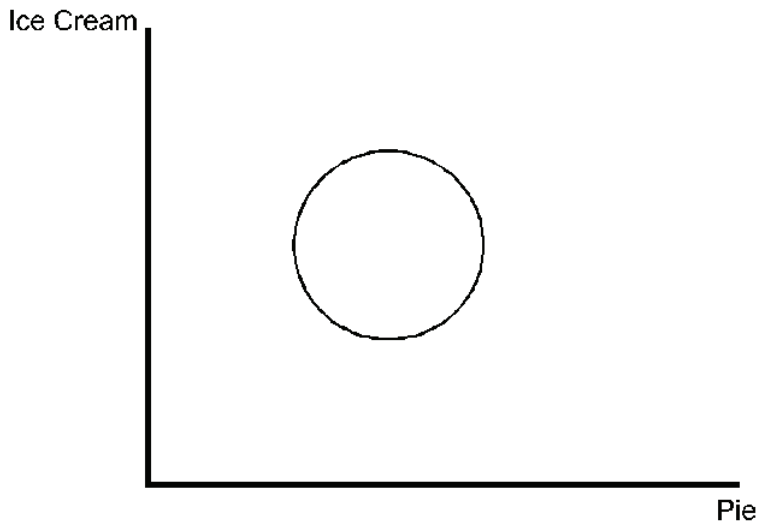
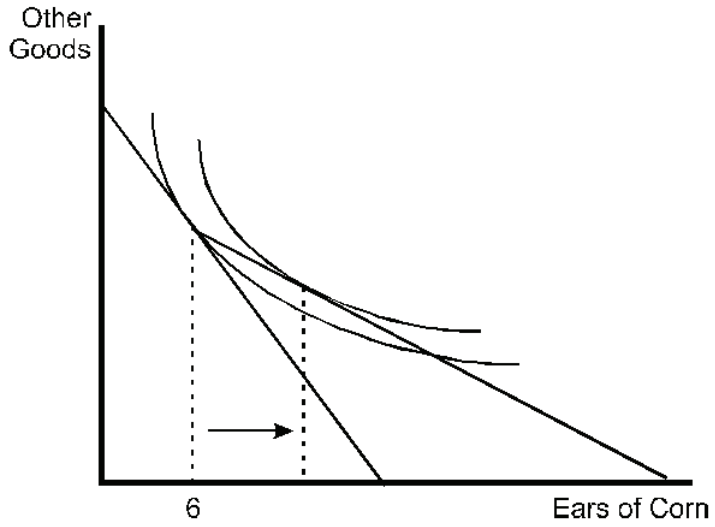


Diff: 3
Section: 3.1

103) The local farmer's market sells corn for 20 cents an ear. At this price, Sam buys 6 ears each Thursday. What would happen to Sam's consumption of corn if the market offered corn at 20 cents an ear for the first 6 ears, but 10 cents an ear for each additional ear? Explain your answer.

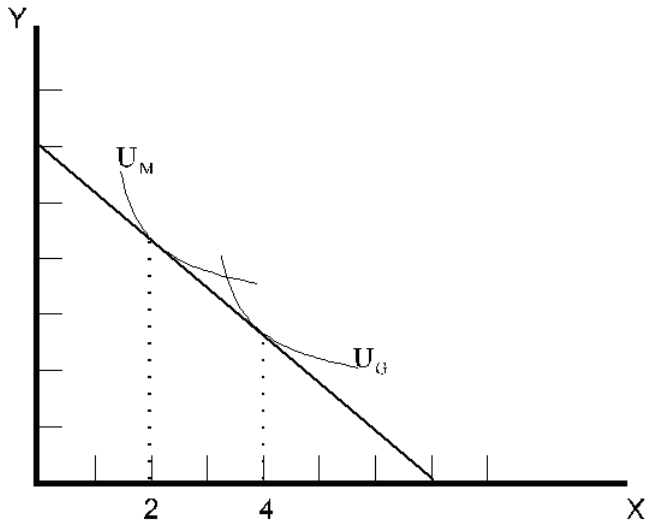
Answer: Sam's budget constraint would now exhibit a "kink" at 6 ears of corn due to the change in the price per ear for high–quantity purchases. From the following figure, we can see that Sam would buy more corn.



Diff: 2
Section: 3.3

104) George has a fixed income and can afford at most 7 units of X if he spends his entire income on X. Alternatively, if he spends all his income on Y, he can afford at most 6 units of Y. Draw George's budget line and an indifference curve such that George chooses to buy 4 pieces of X. Martha has the same income and faces the same prices, yet she chooses to buy 2 pieces of X. In equilibrium, what is George's subjective value of X in terms of Y? What is Martha's?

Answer: In equilibrium, one unit of X will be worth 6/7 units of Y for both George and Martha. The reason is that each consumer choices a consumption bundle so that MRS is equal to the price ratio.

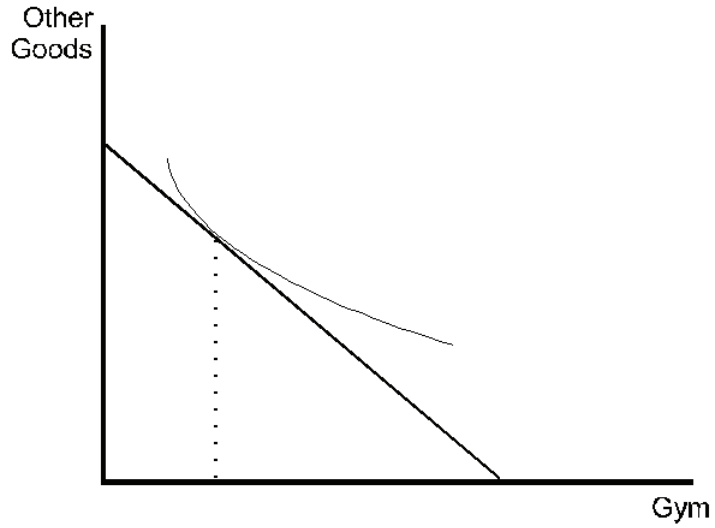


Diff: 2
Section: 3.3

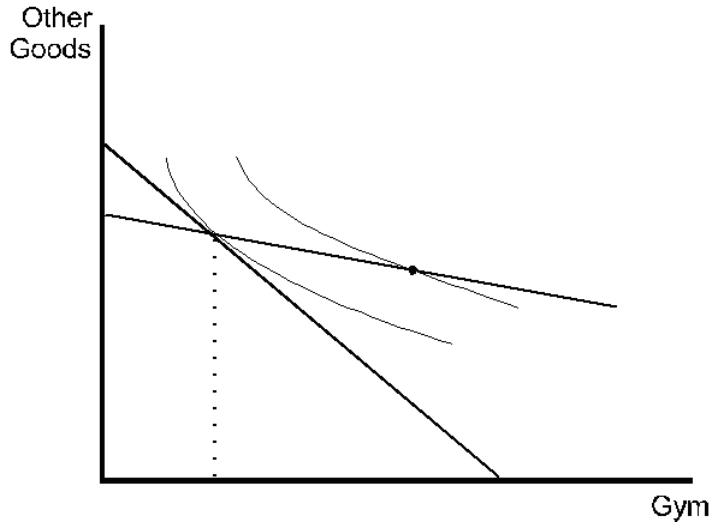
105) Hulk goes to the gym 20 times a month. His income is $1,000 per month and his visits to the gym cost $4 per visit.

a. Draw Hulk's budget line for visits to the gym and all other goods, show the consumption bundle that maximizes his satisfaction, and draw the indifference curve through that point.
b. Recently, a new health club opened which offers identical facilities but which charges a flat fee of $60 per month plus $1 per visit. Draw Hulk's budget line if he were to join this new club.
c. Would Hulk continue to work out at the gym or would he join the new health club. Why?

Answer: ***a.***



b.



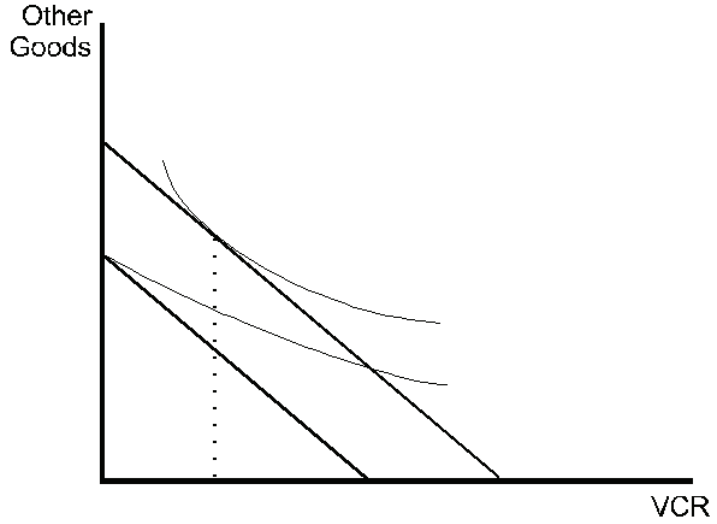
c.

He would join the new health club. Although his current consumption bundle is on both budget lines, the health club's pricing structure makes other, more preferred, bundles affordable.

Diff: 2
Section: 3.3

106) A consumer decides not to buy a VCR when her income is $20,000. However, when her income rises to $30,000, she decides to buy one. In a single diagram, draw the budget lines and indifference curves to illustrate this situation (assume the VCR costs $300 in both time periods). Be sure to label your diagram completely.

Answer:

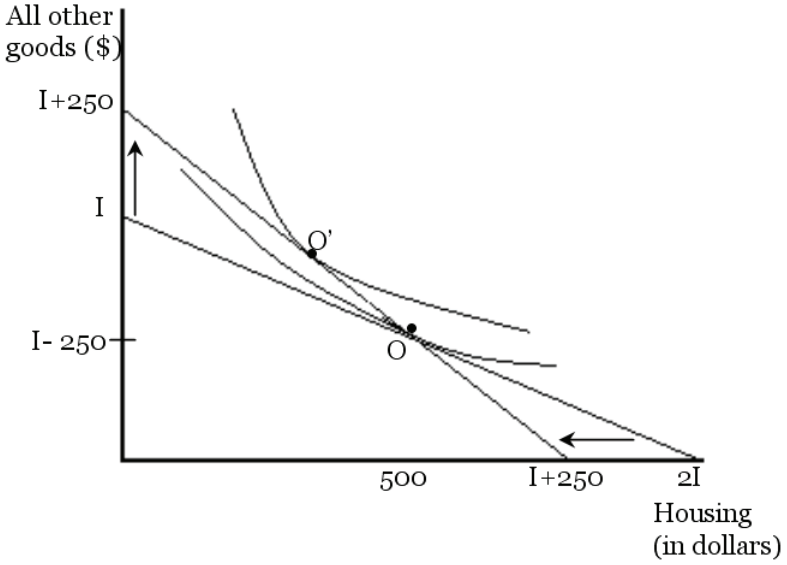


At the lower budget constraint, the consumer is at a corner solution. That is, she purchases no VCRs. The consumer has sufficient income to afford a VCR. However, given her preferences it is optimal to exhaust her budget on other goods. With her increase in income, the budget constraint shifts out. The consumer now has expanded consumption opportunities. In this case, the consumer chooses to purchase a VCR given the higher budget constraint. Purchasing one VCR is optimal as the indifference curve is just tangent to the budget constraint at the consumption bundle consisting of 1 VCR.

Diff: 2
Section: 3.3

107) Suppose that the government subsidizes housing expenditures of low–income families by providing a dollar–for–dollar subsidy to a family's housing expenditure. The Cunninghams qualify for this subsidy and spend a total of $500 per month on housing: they spend $250 of their own and receive a government subsidy of $250. Recently, a new policy has been proposed that would provide each low income family with a lump sum transfer of $250 which can be used for housing or other goods. Using a graph, demonstrate whether the Cunninghams would prefer the current program, the proposed program, or would be indifferent between the two.

Answer:

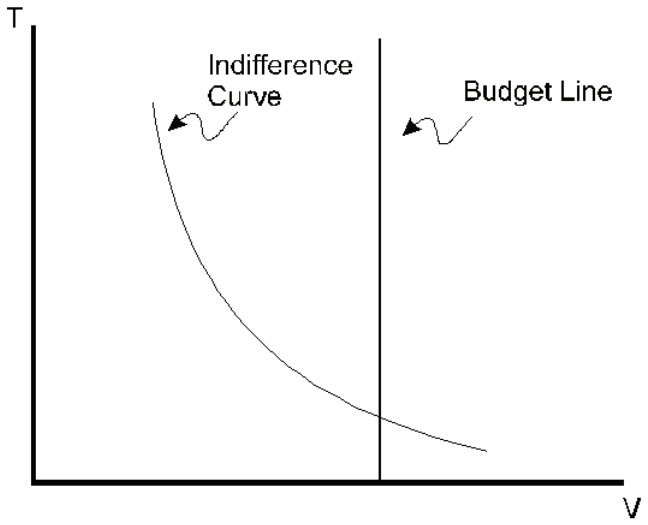


The current program yields the flatter budget constraint for the Cunninghams. The flatter budget constraint implies that the relative cost of housing is cheaper. This is due to the 50% government subsidy. Currently, the Cunninghams spend $250 on housing with the government matching with another $250. The utility maximizing choice is indicated in the diagram by point O. The proposed program would eliminate the government housing price subsidy. Thus, the relative price of housing would increase. This shifts the horizontal axis intercept in towards the origin. However, the proposed plan would pay a cash payment of $250 to the Cunninghams. This payment shifts the vertical axis intercept up. The Cunninghams may still choose to consume at point O as it is available with the proposed plan. However, the MRS at point O is less than the ratio of prices under the proposed plan. This implies the Cunninghams may increase utility by spending less on housing and purchasing more of all other goods. This is reflected by a movement to O' which corresponds with higher utility. Thus, the Cunninghams are better off with the proposed lump sum transfer policy.

Diff: 2
Section: 3.3

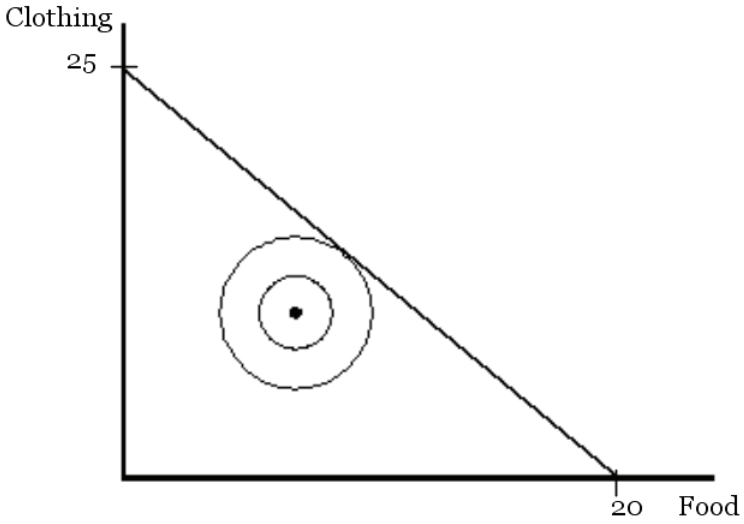
108) Sheila can watch as many television programs as she wants for free, but she must pay $2 for each video she rents. Draw Sheila's budget line for t.v. shows (T) and videos (V), and identify the set of affordable bundles (be sure to label the axes). At a particular point on Sheila's budget line, her MRS is 1T/2V. Illustrate this situation on your diagram. Has Sheila maximized her satisfaction at this point? If not, identify a change in consumption that will make her better off. Describe her preferences when satisfaction is maximized.

Answer: Sheila would be better off if she consumed more television. In fact, she should consume television until the value of an extra television show is zero.



Diff: 3
Section: 3.3

109) Evelyn Lips' preferences are depicted by the set of indifference curves in the diagram below. Her budget line is also shown in the diagram. Use the information in the diagram to answer the following questions.

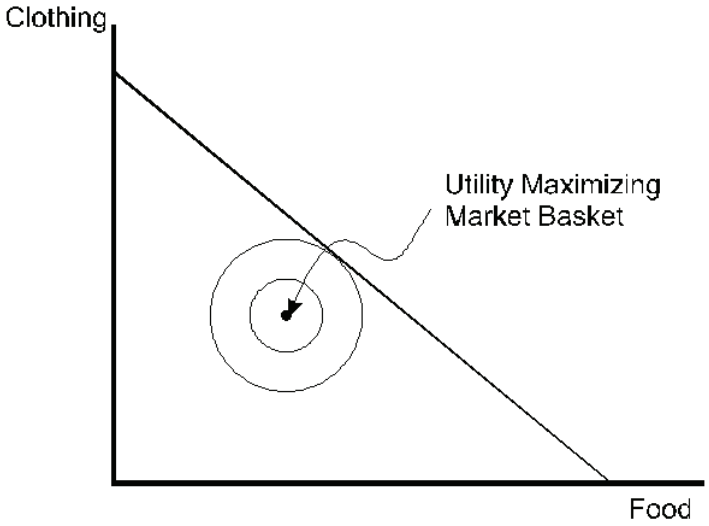


a. Which of the basic assumptions of consumer preferences are violated by E. Lips' indifference curves? Explain.
b. The price of food is $5 per unit. What is E. Lips' income and what is the price of clothing?
c. Show the market basket of food and clothing that maximizes E. Lips' satisfaction. When satisfaction is maximized, has E. Lips equated the marginal rate of substitution (of food for clothing) to the ratio of the prices (of food to clothing)? If so, explain why. If not, explain why not.

Answer: ***a.***
The assumption that consumers always prefer more to less is violated.

b.
E. Lips' income is $100, the price of clothing is $4.

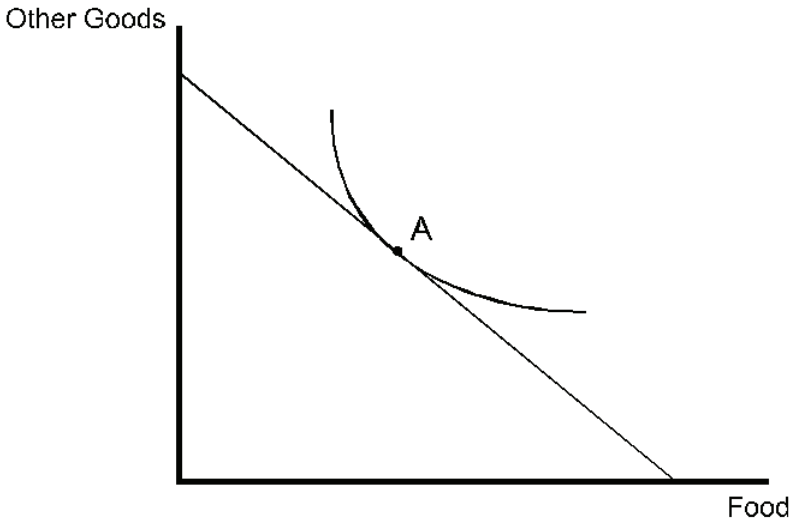
c.



The point in the diagram indicated above is E. Lips' utility maximizing bundle. At this point, E. Lips has no marginal rate of substitution. Since this is the best point for E. Lips, she is unwilling to substitute either good regardless of the price ratio. Any movement from this point will make E. Lips worse off.

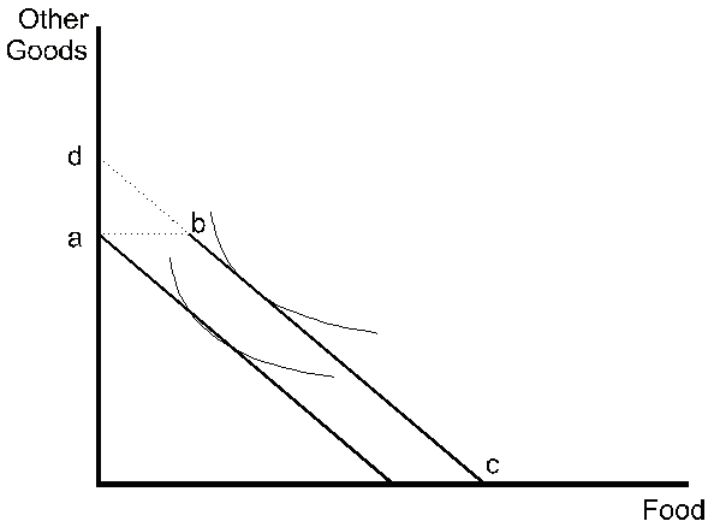
Diff: 3
Section: 3.3

110) Lisa's budget line and her satisfaction maximizing market basket, A, are shown in the diagram below.



a. Suppose that Lisa is given $50 worth of coupons that must be spent on food. How will the coupons alter Lisa's budget line?
b. Suppose that Lisa is given $50 in cash instead of $50 in coupons. How will this alter Lisa's budget line?
c. Is Lisa indifferent between the food coupon and cash program, or does she prefer one program over the other? Draw an indifference curve to illustrate your answer.

Answer: *Refer to the following diagram with the answers.*



a.
With the coupons, Lisa's budget is abc.

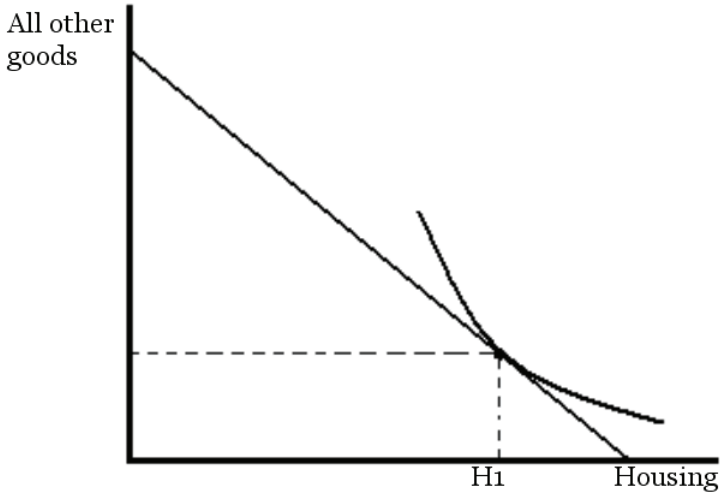
b.
With cash, Lisa's budget line is dbc.

c.
If Lisa's preferences are as shown, she is indifferent between the two programs.

However, if her preferences were such that an indifference curve was tangent to the db portion of dbc, she would prefer cash.

Diff: 3
Section: 3.3

111) Amy is currently spending her income to maximize her satisfaction. She is renting an apartment for $900 per month as shown in the diagram below (Assume each dollar spent on housing buys 1 unit of housing. H1 represents her $900 per month apartment).

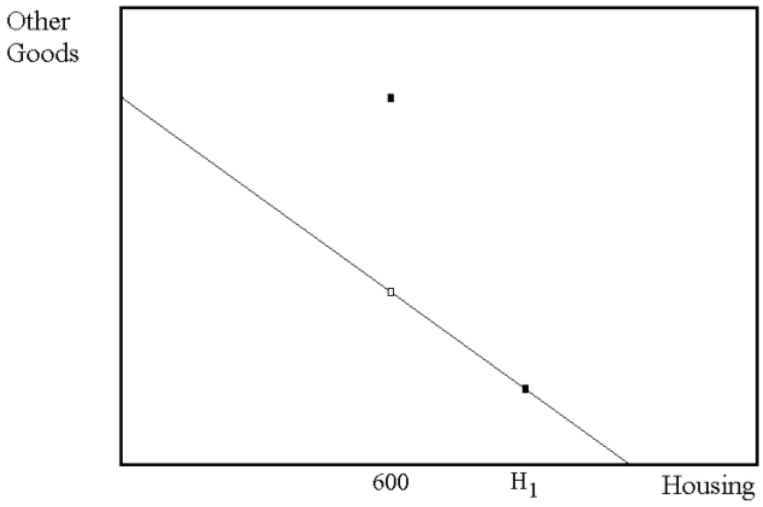


a. Suppose that Amy qualifies for a government housing assistance program that will provide her with a $600 per month apartment at no charge. If she accepts the apartment, she cannot augment her expenditure on housing (for example, she cannot add $300 of her income to the $600 per month provided by the government program, and rent the $900 per month apartment), nor can she exchange the apartment for cash or other goods. How does the government program alter Amy's budget line?

b. Suppose that Amy is given $600 in cash instead of the $600 per month apartment. How will this alter Amy's budget line?

c. Is Amy indifferent between the housing assistance program and cash program, or does she prefer one program over the other? Draw an indifference curve to illustrate your answer.

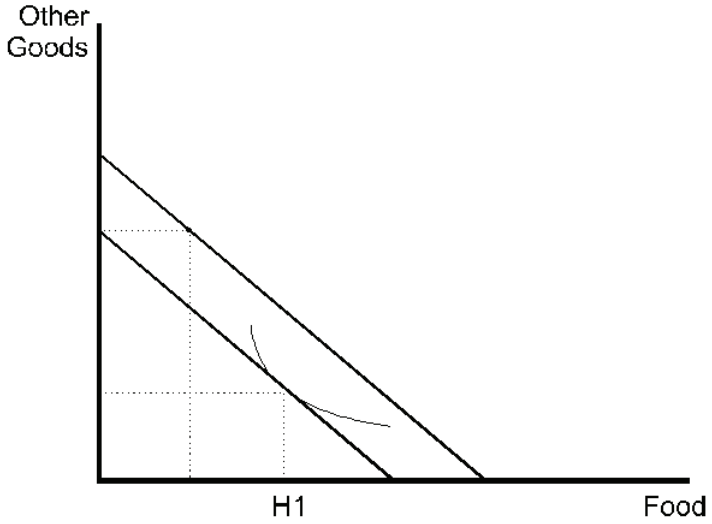
Answer: ***a.***



Amy's budget constraint becomes discontinuous at $600 on housing. If she wishes to spend more or less on housing than $600, she has her original constraints. However, if she chooses to spend $600, then the government pays the entire amount of her housing costs. This allows her to use her complete income to spend solely on other goods. Thus,

at housing of $600, her budget constraint jumps up to allow her to use her entire income to purchase other goods.

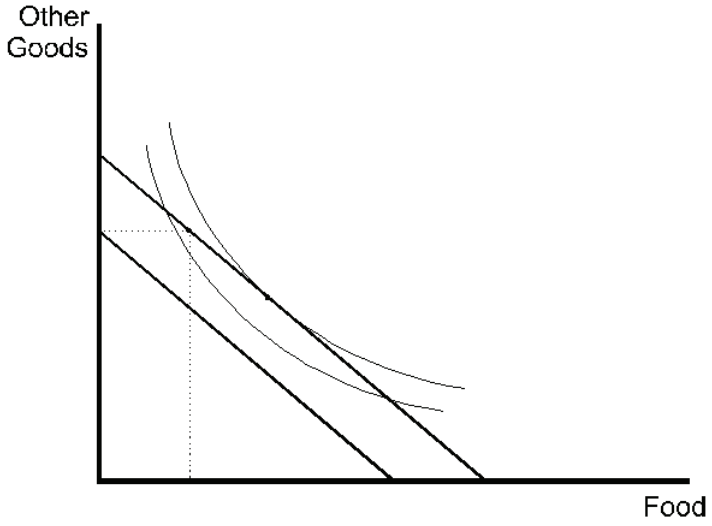
b.



The cash payment is another source of income that Amy may spend at her discretion. Thus, the cash payment is analogous to an increase in income.

c.

Amy would almost always strictly prefer the cash, since it gives her more choices than the free apartment. (If housing is inferior and if her point of tangency on the new budget line is exactly at 600 dollars worth of housing, then Amy would be indifferent between the two programs.)



Diff: 3
Section: 3.3

112) Sally consumes two goods, X and Y. Her utility function is given by the expression $U = 3 \cdot XY^2$. The current market price for X is \$10, while the market price for Y is \$5. Sally's current income is \$500.

a. Sketch a set of two indifference curves for Sally in her consumption of X and Y.
b. Write the expression for Sally's budget constraint. Graph the budget constraint and determine its slope.
c. Determine the X,Y combination which maximizes Sally's utility, given her budget constraint. Show her optimum point on a graph. (Partial units for the quantities are possible.) (Note:$MU_Y = 6XY$ and $MU_X = 3Y^2$.)
d. Calculate the impact on Sally's optimum market basket of an increase in the price of X to \$15. What would happen to her utility as a result of the price increase?

Answer: ***a.***

To draw indifference curves, pick 2 levels of utility and find the values of x and y that hold the total utility constant:

Let U = 60
for Y = 2

$60 = 3 \cdot x(2)^2$
$60 = 3 \cdot x \cdot 4$
$\frac{60}{12} = x$
$x = 5$ y = 2, x = 5

y = 3
$60 = 3 \cdot x(3)^2$
$60 = 3 \cdot x \cdot 9$
$\frac{60}{27} = x$
$x = 2.2$ y = 3, x = 2.2

y = 4
$60 = 3 \cdot x(4)^2$
$60 = 3 \cdot x \cdot 16$
$\frac{60}{48} = x$
$x = 1.25$ y = 4, x = 1.25

Let U = 72
for y = 2

$72 = 3 \cdot x(2)^2$
$72 = 3 \cdot x \cdot 4$
$\frac{72}{12} = x$
$x = 6$ y = 2, x = 6

y = 3
$72 = 3 \cdot x(3)^2$
$72 = 3 \cdot x \cdot 9$

$$\frac{72}{27} = x$$

$x = 2.67$ $\quad$ $y = 3, x = 2.67$

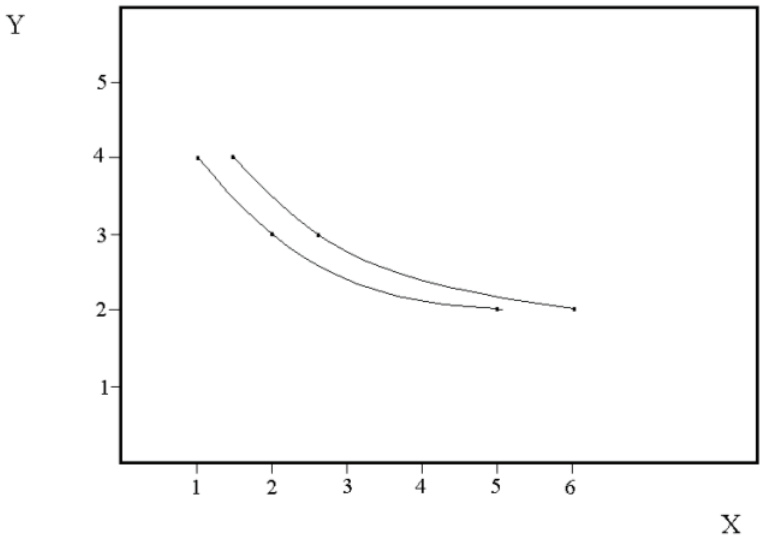
$y = 4$

$72 = 3 \cdot x(4)^2$

$72 = 3 \cdot x \cdot 16$

$$\frac{72}{48} = x$$

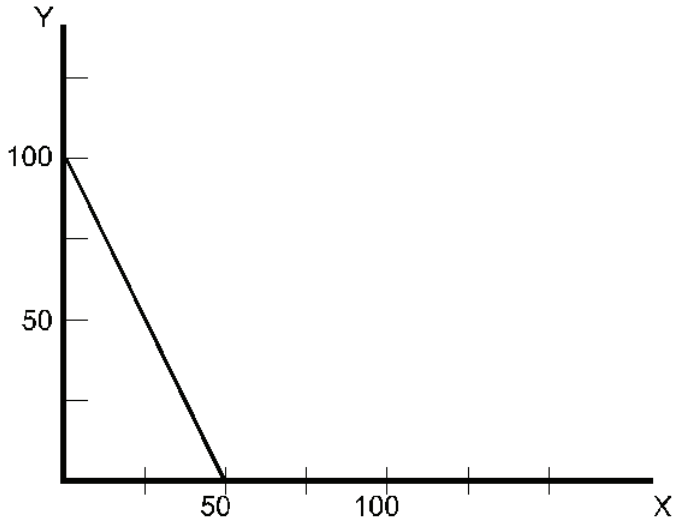
$x = 1.5$ $\quad$ $y = 4, x = 1.5$



b.

$I = P_X x + P_y y$

$500 = 10x + 5y$



$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{-100}{50} = -2$$

c.

To maximize utility, Sally must find the point where MRS is equal to $\frac{P_X}{P_Y}$.

$$MRS = \frac{MU_X}{MU_Y}$$

recall: $MU_Y = 6XY$, $MU_X = 3Y^2$

$$MRS = \frac{3Y^2}{6XY} = \frac{Y}{2X}$$

$$\frac{P_X}{P_Y} = \frac{10}{5} = 2$$

$$\text{set } MRS = \frac{P_x}{P_y}$$

$$\frac{Y}{2X} = 2$$

$$Y = 4X$$

Sally should consume four times as much Y as X.

To determine exact quantities, substitute $Y = 4X$ into

$I = P_XX + P_YY$

$500 = 10X + 5Y$

$500 = 10X + 5(4X)$

$500 = 30X$

$X = 16.67$

$Y = 4(16.67)$

$Y = 66.67$

d.

MRS remains $\frac{Y}{2X}$, $\frac{P_x}{P_y}$ becomes $\frac{15}{5} = 3$

Equating MRS to $\frac{P_x}{P_y}$, $\frac{Y}{2X} = 3$, $Y = 6X$

Substitute $Y = 6X$ into the equation

$500 = 15X + 5Y$

$500 = 15X + 5(6X)$

$500 = 45X$

$X = 11.11$

$Y = 6(11.11)$

$Y = 66.67$

Before price change:

$U = 3(16.67)(66.67)^2 = 222{,}289.$

After price change:

$U = 3(11.11)(66.67)^2 = 148{,}148.$

Utility fell due to the price change. Sally is on a lower indifference curve. (Note: Answers may be slightly different due to rounding.)

Diff: 3
Section: 3.3

113) The food stamp program provides low income households with coupons which can be exchanged for some specified dollar value worth of food. Many economists argue that this program is an inefficient means of increasing the well being of low income families. Proponents of this view argue that an equivalent cash subsidy would bring about a greater increase in the well being of the low income families receiving aid. Although many economists hold this view, not all policy analysts agree with the advocates of cash payments instead of food stamps. Advocates of the existing program argue that food stamps provide an incentive for low income families to increase the nutritional quality of their diets.

a. Carefully analyze the arguments regarding increases in well being under cash payments and food stamp programs. Use graphical analysis to present your arguments.
b. Critically evaluate the pros and cons of the food stamp program. Do food stamps ensure that low income families increase their consumption of food?

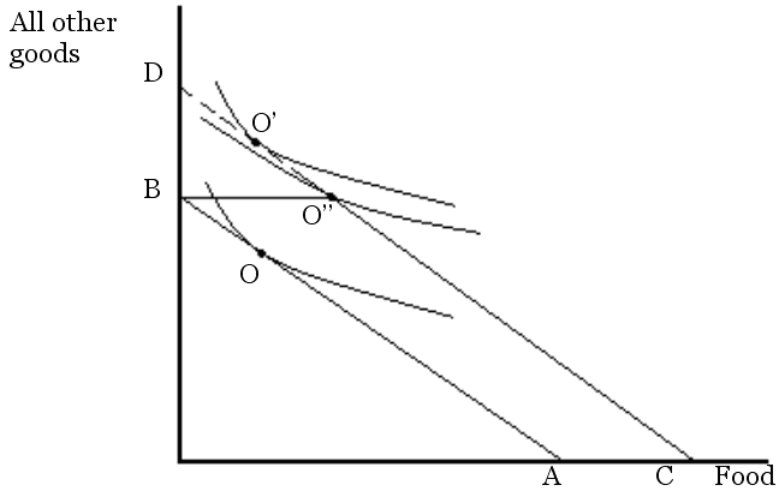
Answer: ***a.***

Answers will vary depending on the way the indifference map is drawn. One type of answer would have a consumer begin in equilibrium at a point like 0. The initial budget constraint is AB.

The government decides to subsidize the low income family an amount equal to AC. If the subsidy is an unrestricted increase in cash, the family's budget constraint will increase to DO''C, and the family may choose a new equilibrium at point 0 (Depending on the exact shape of the indifference curve, the new point of tangency may be anywhere on DO''C.). From the consumer's standpoint, this is the maximum increase in utility that is possible with a subsidy of AC. If food stamps are used instead of a cash subsidy, the entire increase would be spent on food.

Families move to point O'' on a lower indifference curve than 0. It is clear in this particular instance that a cash subsidy would make families better off. However, the food stamp program ensures that at least the value of the non–redeemable stamps are spent on food. This implies in this instance that the nutritional levels of families are likely higher with the food stamp program.

However, if the initial point of tangency on AB were to the right of O, then the food stamps would actually decrease food consumption. Therefore, the effect of food stamps on food consumption depends on the shape of individuals' indifference maps.



b.

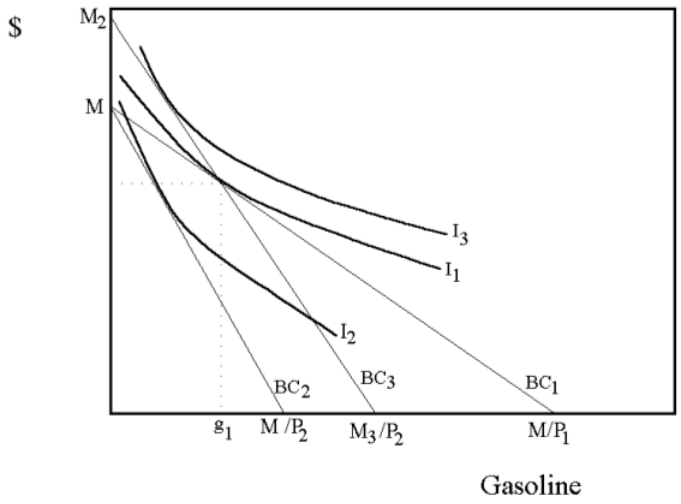
Students should balance subjective factors such as the desirability of improving diet for low income families and the imposition of preferences upon members of low income communities (i.e., the government knows low–income needs better than the families do). It should be made clear, however, that food stamps may not increase expenditures on food by low income families. The families could shift the income spent on food to other goods or sell the food stamps. At point O'', the families' MRS and price ratio are not equal. We would expect families to take steps to reach equilibrium.

Diff: 2
Section: 3.3

114) Suppose that the price of gasoline has risen by 50%. What happens to a consumer's level of well–being given he spends some of his income on gasoline? Diagram the impact of the increase in gas prices in a commodity space diagram, and show the relevant indifference curves.

Now, if the individual's income rises just enough so that his original consumption bundle exactly exhausts his income, will the individual purchase more or less gasoline (this level of income implies the consumer can afford his original consumption bundle)? Is the individual better–off at the higher price level of gasoline with the higher income level or the original price of gas and income?

Answer:



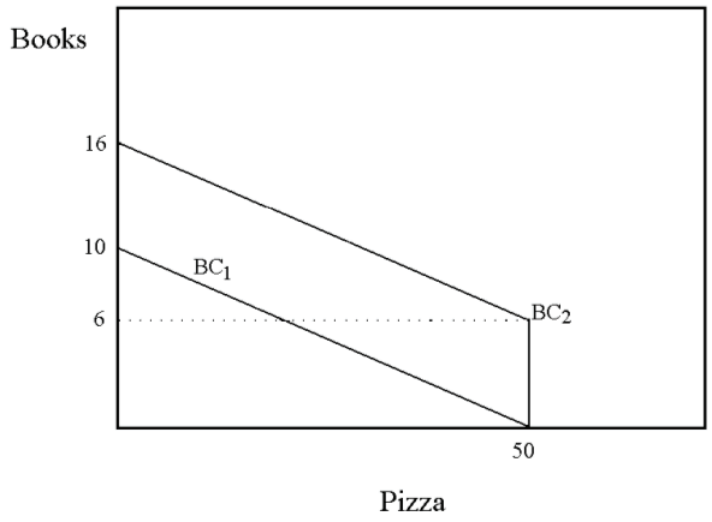
Initially, the consumer is on budget constraint BC_1, consuming g_1 units of gasoline on indifference curve I_1, where M is the individual's income level and P_1 is the price of gasoline. If only the price of gasoline changes to P_2, the horizontal axis intercept of the budget constraint moves towards the origin. This is illustrated above by a movement to the budget constraint BC_2. On indifference I_2, his level of satisfaction is lower than before.

Now, if the individual's income increases just enough so that his original consumption bundle exactly exhausts his new budget. However, the slope of the budget constraint (BC_3) that runs through his original consumption bundle is steeper due to the higher price of gas. This also implies that his MRS is less than the ratio of prices. Thus, the individual can attain a higher level of utility by purchasing less gasoline than g_1. The individual is better–off at higher prices and income than at original levels.

Diff: 2
Section: 3.3

115) Bobby is a college student who has $500 of income to spend each semester on books and pizzas. The price of a pizza is $10 and the price of a book is $50. Diagram Bobby's budget constraint. Now, suppose Bobby's parents buy him a $300 gift certificate each semester that can only be used to buy books. Diagram Bobby's budget constraint when he has the gift certificate in addition to his $500 income. Is Bobby better–off with the gift certificates?

Answer:

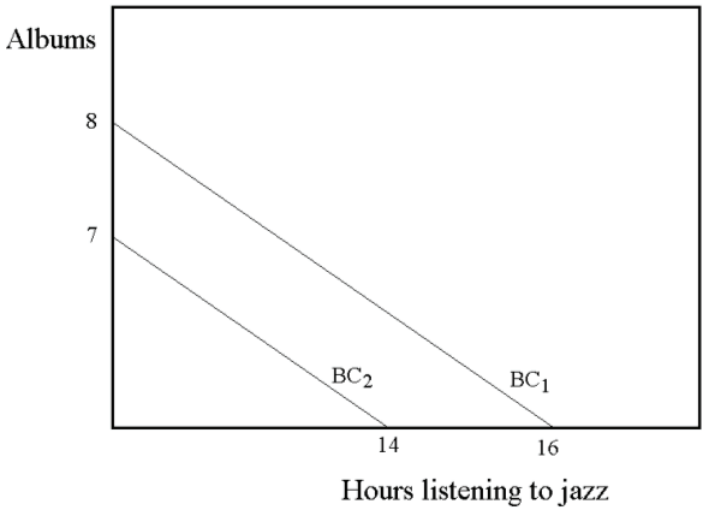


Without the gift certificate, Bobby's budget constraint is indicated by the line segment from 10 books and 0 pizza to 0 books and 50 pizzas (labeled BC_1). With the gift certificate that can only be used for book purchases, Bobby still cannot afford anymore than 50 pizzas. However, he is guaranteed 6 books even if he spends all his money on pizza. Since the price of books and pizza hasn't changed, the slope of his new budget constraint is the same as the slope of the old budget constraint. The new budget constraint is drawn above as BC_2. Note that with the gift certificate, Bobby has an expanded opportunity set and is guaranteed more of both goods no matter what his original consumption choice on BC_1 was. This implies that Bobby is strictly better–off with the gift certificate.

Diff: 2
Section: 3.3

116) Larry lives with his parents and enjoys listening to jazz. Because of his living arrangements, his only expense is on jazz music. To earn money to buy new albums, Larry must work. Larry has 16 hours per day he could spend listening to jazz or working. Each hour he works he earns $6. Each album costs him $12. Diagram Larry's budget constraint for new jazz albums and time spent listening to jazz. If Larry's parents require him to spend two hours per day doing chores around the house, what happens to his budget constraint? Does the requirement to do chores make Larry worse off?

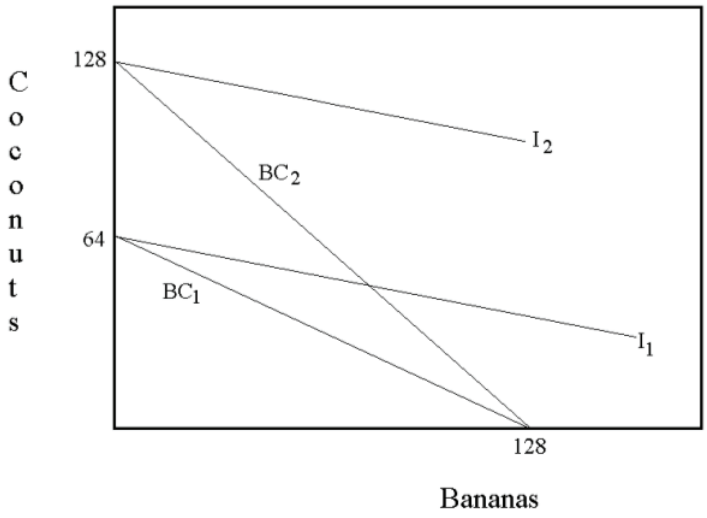
Answer: Larry's budget constraints are indicated on the following diagram. Before his parents require him to do chores, his budget constraint is BC_1. After the requirement to do chores, his budget constraint becomes BC_2. Since the requirement to do chores contracts his opportunity set and we see he no longer may choose an optimal bundle on BC_1, we know Larry is strictly worse off.



Diff: 2
Section: 3.3

117) Roberta lives alone on a deserted island. She can spend her time gathering coconuts or bananas. She has 16 hours available each day and can gather 4 coconuts in an hour or 8 bananas in an hour. Diagram Roberta's budget constraint. Given that Roberta's Marginal Utility of bananas is always 25 and her Marginal utility of coconuts is always 100, what is her optimal consumption? One day an individual from a neighboring island arrives by boat and offers to exchange any number of fruits at a rate of 1 coconut for 1 banana. Diagram Roberta's budget constraint at this exchange rate assuming she will now spend all her time gathering bananas. Is Roberta better off? What does she consume?

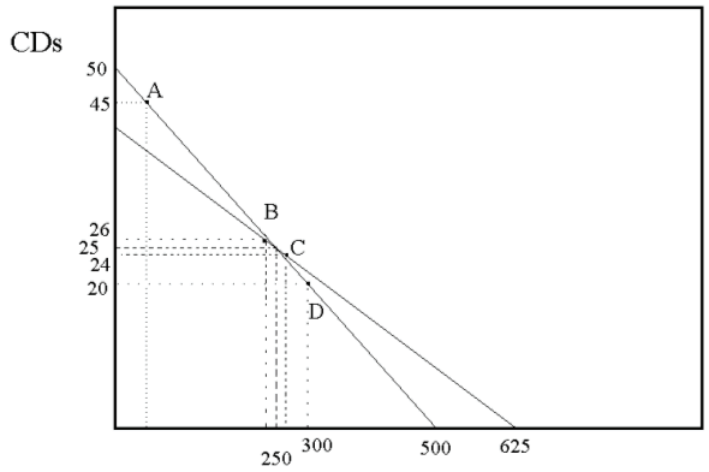
Answer: Roberta's initial budget constraint is BC_1 on the diagram below. Since Roberta's indifference curves are always flatter than her budget constraint, Roberta will consume all coconuts. Thus, she gathers and consumes 64 coconuts. When her neighbor arrives and offers the exchange, her budget constraint becomes BC_2. It is now optimal for her to gather all bananas and exchange them 1 for 1 with her neighbor for coconuts. This gives her 128 coconuts to consume. This brings her to the higher indifference curve I_2. Roberta is better off.



Diff: 2
Section: 3.3

118) Tammy and Tad's father has given each of them a debit card and allows each of them to use the card to spend $500 each month. Tammy and Tad use their $500 to buy only CDs and gasoline. In February, the price of a CD was $10 and the price of gasoline was $1 per gallon. At these prices, Tammy purchased 45 CDs and 50 gallons of gas. Ted consumed 20 CDs and 300 gallons of gas. For the month of March, Tammy and Tad's father lost the records indicating who had which debit card. From the bank statement in March, their father learned that the price of a CD was $12 and a gallon of gas cost $0.80. The first debit card was used to purchase 235 gallons of gas and 26 CDs. The second debit card was used to purchase 265 gallons of gas and 24 CDs. Using revealed preference theory, identify which card Tammy must possess.

Answer:



From the diagram, we see that point D is revealed preferred to point B. This implies that Tad would not choose to consume at point B. Thus, we know that Tad must have consumed at point C and has the second debit card. This means Tammy has the first debit card.

Diff: 2
Section: 3.4

119) Jane lives in a dormitory that offers soft drinks and chips for sale in vending machines. Her utility function is U = 3SC (where S is the number of soft drinks per week and C the number of bags of chips per week), so her marginal utility of S is 3C and her marginal utility of C is 3S. Soft drinks are priced at $0.50 each, chips $0.25 per bag.

a. Write an expression for Jane's marginal rate of substitution between soft drinks and chips.
b. Use the expression generated in part (a) to determine Jane's optimal mix of soft drinks and chips.
c. If Jane has $5.00 per week to spend on chips and soft drinks, how many of each should she purchase per week?

Answer: ***a.***

$$MRS = \frac{MU_S}{MU_C}$$

$$MRS = \frac{3C}{3S} = \frac{C}{S}$$

b.

The optimal market basket is where

$$MRS = \frac{P_S}{P_C}$$

$$\text{Requires} = \frac{C}{S} = \frac{.5}{.25}$$

$$\frac{C}{S} = 2,\ C = 2S$$

Jane should buy twice as many chips as soft drinks.

c.

Jane must satisfy her budget constraint as well as optimal mix.
Her budget constraint is:

$$I = P_S S + P_C C$$

where I = income

$$5.00 = .5S + .25C$$

But she must also satisfy C = 2S, the optimal mix. Substitute 2S for C into budget constraint

$$5.00 = .5S + .25(2S)$$
$$5 = .5S + .5S$$
$$5 = S$$

Buy 5 soft drinks.
Substitute into either expression to obtain C

$$C = 2S$$
$$C = 2(5)$$
$$C = 10$$

Jane should spend her $5.00 to buy 5 soft drinks and 10 bags of chips.

Diff: 2
Section: 3.5

120) An individual consumes products X and Y and spends $25 per time period. The prices of the two goods are $3 per unit for X and $2 per unit for Y. The consumer in this case has a utility function expressed as:

$U(X,Y) = .5XY \qquad MU_X = .5Y \qquad MU_Y = .5X.$

a. Express the budget equation mathematically.
b. Determine the values of X and Y that will maximize utility in the consumption of X and Y.
c. Determine the total utility that will be generated per unit of time for this individual.

Answer: ***a.***

The budget line can be expressed as:

$I = P_X X + P_Y Y$

$25 = 3X + 2Y$

b.

In equilibrium, maximizing utility, the following relationship must hold:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

In equilibrium

$(0.5\ Y)/3 = (0.5\ X)/2$

$2Y = 3X,\ Y = (3/2)X$

Thus the amount of Y to consume is 3/2 of the amount of X that is consumed. On the budget line

$$25 = 3X + 2(\frac{3}{2}X)$$

$25 = 3X + 3X = 6X$

$X = 4.17$ units per time period.

$Y = \frac{3}{2}(4.17) = 6.25$ units per time period.

c.

The total utility is

$U(x,y) = 0.5(4.17)(6.25)$

$= 13.03$ units of utility per time period.

Diff: 2
Section: 3.5

121) Janice Doe consumes two goods, X and Y. Janice has a utility function given by the expression:

$U = 4X^{0.5}Y^{0.5}$.

So, $MU_X = \frac{2Y^{0.5}}{X^{0.5}}$ and $MU_Y = \frac{2X^{0.5}}{Y^{0.5}}$. The current prices of X and Y are 25 and 50, respectively.

Janice currently has an income of 750 per time period.

a. Write an expression for Janice's budget constraint.
b. Calculate the optimal quantities of X and Y that Janice should choose, given her budget constraint. Graph your answer.
c. Suppose that the government rations purchases of good X such that Janice is limited to 10 units of X per time period. Assuming that Janice chooses to spend her entire income, how much Y will Janice consume? Construct a diagram that shows the impact of the limited availability of X. Is Janice satisfying the usual conditions of consumer equilibrium while the restriction is in effect?
d. Calculate the impact of the ration restriction on Janice's utility.

Answer: ***a.***

$I = PxX + PyY$
$750 = 25X + 50Y$

b.

Optimal Combination:

$$MRS = \frac{P_X}{P_Y}$$

$$MRS = \frac{MU_X}{MU_Y} = \frac{2}{2} \qquad \frac{\frac{Y^{.5}}{X^{.5}}}{\frac{X^{.5}}{Y^{.5}}}$$

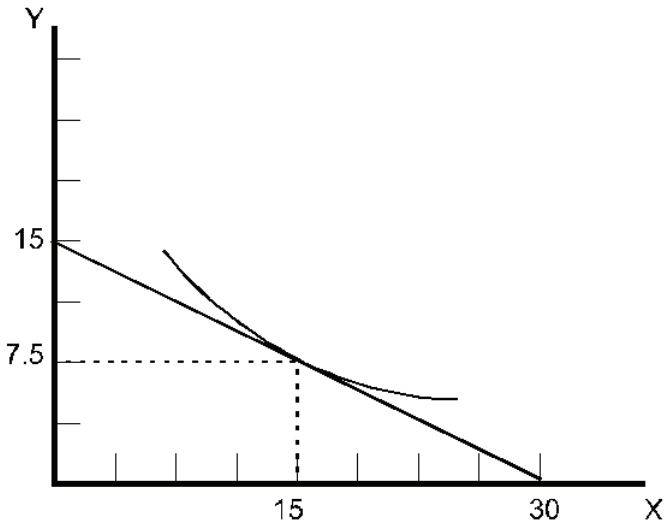
$$MRS = \frac{Y}{X}$$

$$\frac{P_X}{P_Y} = \frac{25}{50} = \frac{1}{2}$$

Equating MRS to $\frac{P_X}{P_Y}$:

$$\frac{Y}{X} = \frac{1}{2},\ Y = \frac{1}{2}X$$

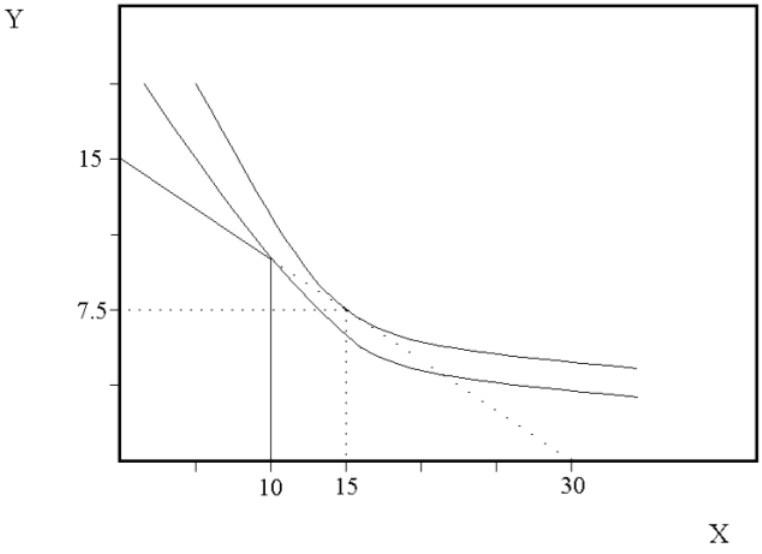
Janice should buy 1/2 as much Y as X.
Recall $750 = 25X + 50Y$
Substitute $(1/2)X$ for Y
$750 = 25X + 50(1/2)X$
$750 = 25X + 25X$
$750 = 50X$
$X = 15$
$Y = (1/2)X$
$Y = (1/2)(15)$
$Y = 7.5$
Janice should consume 7.5 units of Y and 15 units of X.



c.

$750 = 25X + 50Y$
$X = 10$
$750 = 25(10) + 50Y$
$500 = 50Y$
$Y = 10$

As indicated in the graph below, at Janice's optimal bundle with the restriction, $\frac{MU_X}{P_X} > \frac{MU_Y}{P_Y}$. This implies Janice should consume more X to increase utility. However, the ration restriction prevents her from doing so. Given the restriction, this is the best Janice can do.



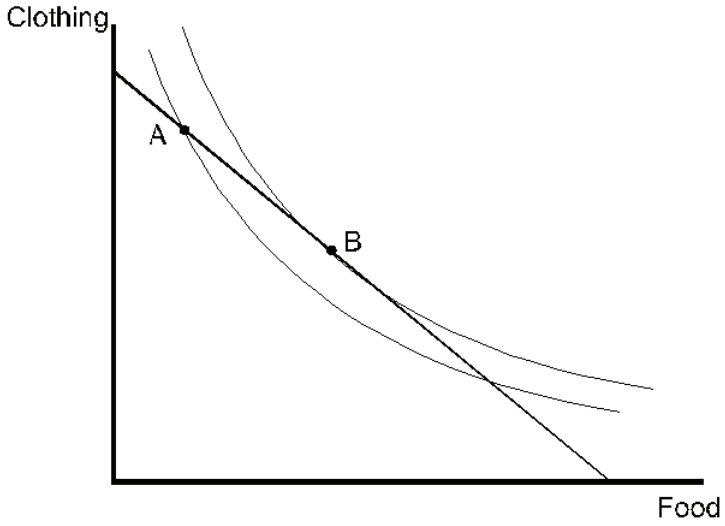
d.

Janice's utility without the restriction is: $U(x = 15, y = 7.5) = 4(15)^{0.5}(7.5)^{0.5} = 42.43$.
Janice's utility with the restriction is: $U(x = 10, y = 10) = 4(10)^{0.5}(10)^{0.5} = 40$. The ration

restriction results in a utility loss of 2.43 utils for Janice.

Diff: 3
Section: 3.5

122) Define the marginal rate of substitution. Using this concept, explain why market basket A is not utility maximizing while market basket B is utility maximizing.



Answer: The marginal rate of substitution is the magnitude of the slope of an indifference curve. It is the *maximum* amount of one good (clothing) that a consumer is willing to give up to get another unit of another good (food). In an indifference curve diagram, MRS measures the subjective value of the good on the horizontal axis in terms of the good on the vertical axis. In this example, if the slope of the indifference curve through A were, say, 5, the consumer would be willing to exchange 1 unit of food for 5 units of clothing.

The slope of the budget line, on the other hand, measures the market value of the good on the horizontal axis in terms of the good on the vertical axis. In this example, the indifference curve through A is steeper than the budget line, so the consumer's value of good is greater than the market price. He would be better off if he bought more food.

Diff: 2
Section: 3.5

123) The local mall has a make–your–own sundae shop. They charge customers 35 cents for each fresh fruit topping and 25 cents for each processed topping. Barbara is going to make herself a sundae. The total utility that she receives from each quantity of topping is given by the following table:

Fresh Fruit Topping		Processed Topping	
# of Units	Total Utility	# of Units	Total Utility
1	10	1	10
2	18	2	20
3	24	3	10
4	28	4	0
5	30	5	–10
6	28	6	–20
7	24	7	–30
8	18	8	–40
9	10	9	–50
10	–6	10	–60

a. What is the marginal utility of the 6th fresh fruit topping?
b. Of the two toppings, which would Barbara purchase first? Explain.
c. If Barbara has $1.55 to spend on her sundae, how many fresh fruit toppings and processed toppings will she purchase to maximize utility?
d. If money is no object, how many fresh fruit toppings and processed toppings will Barbara purchase to maximize utility?
e. Which of the basic assumptions of preferences are violated by preferences shown in the table above?

Answer: ***a.***
The marginal utility of the 6th fresh fruit topping is –2 utils (28 utils – 30 utils).

b.
Barbara will purchase the topping that provides the largest marginal utility per dollar spent. The marginal utility divided by price for the first unit of fresh fruit topping is 10/.35. The marginal utility divided by price for the first unit of processed topping is 10/.25. Thus the first topping purchased will be processed (because 10/.25 > 10/.35).

c.
Barbara will continue to purchase toppings, one at a time, until she spends $1.55, by always selecting the topping that provides the largest marginal utility per dollar spent. Barbara will purchase 2 processed toppings first, followed by 3 fresh fruit toppings.

d.
If money is no object, Barbara will purchase an additional unit of each topping as long as the topping provides a positive marginal utility. In this case, 2 processed toppings and 5 fresh fruit toppings.

e.
The preferences used in this problem violate the assumption that consumers always prefer more of a good to less.

Diff: 2
Section: 3.5

124) If MUa/Pa is greater than MUb/Pb, and the consumer is consuming both goods, the consumer is not maximizing utility. True or false. Explain.

Answer: True, when the consumer has maximized utility, the marginal utility per dollar spent on each good purchased will be equal, and the consumer will be on her budget line. In this case, the consumer should consume more a and less b.

Diff: 2
Section: 3.5

125) John consumes two goods, X and Y. The marginal utility of X and the marginal utility of Y satisfy the following equations:

$MU_X = Y$ $MU_Y = X$.

The price of X is $9, and the price of Y is $12.

a. Write an expression for John's MRS.
b. What is the optimal mix between X and Y in John's market basket?
c. John is currently consuming 15 X and 10 Y per time period. Is he consuming an optimal mix of X and Y?

Answer: ***a.***

$$MRS = \frac{MU_X}{MU_Y} = \frac{Y}{X}$$

b.

Optimal mix of X and Y:

$$MRS = \frac{P_X}{P_y}$$

$$\frac{Y}{X} = \frac{9}{12} = .75$$

John should consume 0.75 times as much Y as X

c.

John's current mix is not optimal. He should consume 0.75 times as much Y as X, rather than his current 0.67 Y for each X.

Diff: 2
Section: 3.5

126) Natasha derives utility from attending rock concerts (r) and from drinking colas (c) as follows:

$U(c,r) = c^{.9}r^{.1}$

The marginal utility of cola (MUc) and the marginal utility of rock concerts (MUr) are given as follows:

$MUc = .9c^{-.1}r^{.1}$ $\quad\quad$ $MUr = .1c^{.9}r^{-.9}$

a. If the price of cola (Pc) is \$1 and the price of concert tickets (Pr) is \$30 and Natasha's income is \$300, how many colas and tickets should Natasha buy to maximize utility?

b. Suppose that the promoters of rock concerts require each fan to buy 4 tickets or none at all. Under this constraint and given the prices and income in (a), how many colas and tickets should Natasha buy to maximize utility?

c. Is Natasha better off under the conditions in (a) or (b)? Explain your answer.

Answer: ***a.***

To maximize utility, Natasha (1) must be on her budget line, and (2) the marginal rate of substitution must equal the ratio of the prices of the goods. The marginal rate of substitution is equal to the ratio of the marginal utilities of the goods. Thus:

(1) $c + 30r = 300$

(2) $MUc/MUr = (.9c^{-.1}r^{.1})/(.1c^{.9}r^{-.9}) = Pc/Pr = 1/30$

Solving these equations simultaneously for c and r yields $c = 270$ and $r = 1$.

b.

Without the 4 ticket constraint, Natasha would prefer to buy just 1 ticket. If required to buy 4 tickets, Natasha would maximize utility by either buying 4 tickets and consuming 180 colas, or by buying zero tickets and consuming 300 colas. The utility function may be used to determine which is preferred. In this case, Natasha will buy zero tickets and 300 colas.

c.

Natasha prefers (a) because constraining the choice set never leaves one better off. At best it has no effect. Otherwise, the addition of a constraint leaves one worse off.

Diff: 2
Section: 3.5

127) The following table presents Alfred's marginal utility for each good while exhausting his income. Fill in the remaining column in the table. If the price of tuna is twice the price of peanut butter, at what consumption bundle in the table is Alfred maximizing his level of satisfaction? Which commodity bundle entails the largest level of tuna fish consumption?

Bundle	MU of peanut butter	MU of tuna	Marginal Rate of Substitution
A	0.25	2.41	
B	0.31	1.50	
C	0.42	0.84	
D	0.66	0.33	

Answer:

Bundle	$MRS = \frac{MU_{pb}}{MU_t}$	$MRS = \frac{MU_t}{MU_{pb}}$
A	0.10	9.64
B	0.21	4.84
C	0.5	2
D	2	0.5

The optimal bundle occurs where $MRS = \frac{MU_t}{MU_{pb}} = \frac{P_t}{P_{pb}} = 2$. This implies that commodity bundle C is the optimal bundle. The bundle that has the highest level of tuna fish consumption is bundle D as the marginal utility of tuna is the lowest. (Alternatively, the student could have defined MRS with the two goods reversed. In that case the optimal bundle occurs where

$MRS = MU_{pb}/MU_t = P_{pb}/P_t = 1/2$. In either case, the answer is the same.)

Diff: 2
Section: 3.5

128) The following table presents Mary's marginal utility for each of the four goods she consumes to exhaust her income. The price of Good 1 is \$1, the price of Good 2 is \$2, the price of Good 3 is \$3 and the price of Good 4 is \$4. Indicate the consumption bundle in the table that maximizes Mary's level of utility.

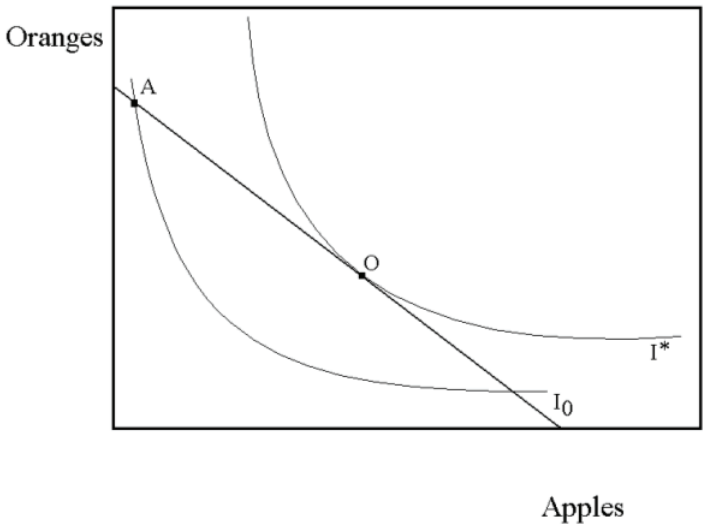
Bundles	Marginal Utilities			
	Good 1	Good 2	Good 3	Good 4
A	0.21	0.06	1.76	0.59
B	0.22	0.54	0.56	0.18
C	0.17	0.34	0.51	0.68
D	0.20	0.46	0.61	0.27

Answer: In equilibrium, we know that $\frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \frac{MU_3}{P_3} = \frac{MU_4}{P_4}$. Since $P_2 = 2P_1$, we know we need a bundle such that $MU_2 = 2MU_1$. This only occurs at bundle C. In fact, the marginal utility per dollar across all goods are equivalent for bundle C. Bundle C is the optimal choice.

Diff: 2
Section: 3.5

129) At commodity bundle A, which consists of only apples and oranges, Annette's marginal utility per dollar spent on apples is 10 and her marginal utility per dollar spent on oranges is 8. Diagram a representative budget constraint and indifference curve that that passes through bundle A given Annette's budget is exhausted at bundle A. Is Annette maximizing utility? Why or why not? If she is not, what could she do to increase her level of satisfaction?

Answer:



Annette should buy more apples and fewer oranges to increase her level of satisfaction.

Diff: 2
Section: 3.5

130) May enjoys spending her free time with her friends at the mall and solving problems from her microeconomics text. She has 16 hours per week of free time. Diagram May's time constraint. If $MU_F = \frac{3}{4}\left(\frac{P}{F}\right)^{1/4}$ and $MUP = \frac{1}{4}\left(\frac{F}{P}\right)^{3/4}$ where F is her time spent with friends at the mall and P is her time spent working problems, how much time should May spend at each activity?

Answer: The time constraint is 16 = F + P.

Since the price of each activity is equivalent, May's optimal choice will be to set the marginal utilities of each activity to be equal. Doing so will allow us to solve for time spent with friends as a function of time spent working problems.

$MU_F = \frac{3}{4}\left(\frac{P}{F}\right)^{1/4} = \frac{1}{4}\left(\frac{F}{P}\right)^{3/4} = MUP \Rightarrow F = 3P$. From May's time constraint, we know that $16 = F + P$. Substituting the optimal choice of F as a function of P into the time constraint gives us $16 = 4P \Leftrightarrow \begin{matrix} P = 4 \\ F = 12 \end{matrix}$.

Diff: 2
Section: 3.5

131) Suppose the table below lists the price and consumption levels of food and clothing during 1990 and 2000. Calculate a Laspeyres and Paasche index using 1990 as the base year.

Year	Prices		Consumption	
	Food	Clothing	Food	Clothing
1990	5.00	3.00	100	75
2000	6.25	3.35	110	87

Answer: The Laspeyres Index is calculated as follows:

$$LI = \frac{P^F_{2000} F_{1990} + P^C_{2000} C_{1990}}{P^F_{1990} F_{1990} + P^C_{1990} C_{1990}} = \frac{(6.25)100 + (3.35)75}{(5)100 + (3)75} = \frac{876.25}{725} = 1.209.$$

The Paasche Index is calculated as follows:

$$PI = \frac{P^F_{2000} F_{2000} + P^C_{2000} C_{2000}}{P^F_{1990} F_{2000} + P^C_{1990} C_{2000}} = \frac{(6.25)110 + (3.35)87}{(5)110 + (3)87} = \frac{978.95}{811} = 1.207.$$

Diff: 2
Section: 3.6

132) Suppose that a consumer's increase in nominal income from the base year exceeds the inflation level given by a Laspeyres cost of living index for their level of purchases $\left(\frac{P_t^F F_b + P_t^C C_b}{P_b^F F_b + P_b^C C_b} < \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_b + P_b^C C_b} \right)$. Show that this information implies that the consumer is strictly better–off as compared to the base year. (HINT: Use a revealed preference argument)

Answer: The information given above implies that

$$LI = \frac{P_t^F F_b + P_t^C C_b}{P_b^F F_b + P_b^C C_b} < \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_b + P_b^C C_b} = \frac{I_t}{I_b} \Leftrightarrow P_t^F F_b + P_t^C C_b < P_t^F F_t + P_t^C C_t.$$ This expression says that the commodity bundle purchased in the base period is affordable in the new period. However, the consumer selected a more expensive bundle. Thus, the new commodity bundle is revealed preferred to the base year commodity bundle.

Diff: 2
Section: 3.6

133) Suppose that a consumer's increase in nominal income from the base year is exceeded by the inflation level given by a Paasche cost of living index for their level of purchases $\left(\frac{P_t^F F_t + P_t^C C_t}{P_b^F F_t + P_b^C C_t} < \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_b + P_b^C C_b} \right)$. Show that this information implies that the consumer is strictly worse–off as compared to the base year. (HINT: Use a revealed preference argument)

Answer: The information given above implies that

$$PI = \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_t + P_b^C C_t} > \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_b + P_b^C C_b} = \frac{I_t}{I_b} \Leftrightarrow P_b^F F_b + P_b^C C_b > P_b^F F_t + P_b^C C_t.$$ This expression says that the commodity bundle purchased in the new period was affordable in the base period. However, the consumer selected a more expensive bundle in the base year. Thus, the base year commodity bundle is revealed preferred to the new commodity bundle.

Diff: 2
Section: 3.6

134) Suppose that a consumer's increase in nominal income from the base year exceeds the inflation level given by a Paasche cost of living index for their level of purchases $\left(\frac{P_t^F F_t + P_t^C C_t}{P_b^F F_t + P_b^C C_t} < \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_b + P_b^C C_b} \right)$. Is this information enough to imply how the consumer's level of well–being has changed? (HINT: Use a revealed preference argument)

Answer: There is not enough information to determine the effect on the individual's level of satisfaction. This can be shown as follows:

$$PI = \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_t + P_b^C C_t} < \frac{P_t^F F_t + P_t^C C_t}{P_b^F F_b + P_b^C C_b} = \frac{I_t}{I_b} \Leftrightarrow P_b^F F_b + P_b^C C_b < P_b^F F_t + P_b^C C_t.$$

The base year consumption bundle is not revealed preferred to the new commodity bundle.

Diff: 3
Section: 3.6

Chapter 4 Individual and Market Demand

1) As we move downward along a demand curve for apples,
   A) consumer well–being decreases.
   B) the marginal utility of apples decreases.
   C) the marginal utility of apples increases.
   D) Both A and B are true.
   E) Both A and C are true.

   Answer: B
   Diff: 1
   Section: 4.1

2) The change in the price of one good has no effect on the quantity demanded of another good. These goods are:
   A) complements.
   B) substitutes.
   C) both inferior.
   D) both Giffen goods.
   E) none of the above

   Answer: E
   Diff: 1
   Section: 4.1

3) The price of good A goes up. As a result the demand for good B shifts to the left. From this we can infer that:
   A) good A is a normal good.
   B) good B is an inferior good.
   C) goods A and B are substitutes.
   D) goods A and B are complements.
   E) none of the above

   Answer: D
   Diff: 1
   Section: 4.1

4) An individual demand curve can be derived from the _____ curve.
   A) price–consumption
   B) price–income
   C) income–substitution
   D) income–consumption
   E) Engel

   Answer: A
   Diff: 1
   Section: 4.1

5) Which of the following claims is true at each point along a price–consumption curve?
A) Utility is maximized but income is not all spent.
B) All income is spent, but utility is not maximized.
C) Utility is maximized, and all income is spent.
D) The level of utility is constant.

Answer: C
Diff: 1
Section: 4.1

6) Which of the following is true regarding income along a price–consumption curve?
A) Income is increasing.
B) Income is decreasing.
C) Income is constant.
D) The level of income depends on the level of utility.

Answer: C
Diff: 2
Section: 4.1

7) Which of the following is true regarding utility along a price–consumption curve?
A) It is constant.
B) It changes from point to point.
C) It changes only if income changes.
D) It changes only for normal goods.

Answer: B
Diff: 2
Section: 4.1

8) The income–consumption curve
A) illustrates the combinations of incomes needed with various levels of consumption of a good.
B) is another name for income–demand curve.
C) illustrates the utility–maximizing combinations of goods associated with every income level.
D) shows the utility–maximizing quantity of some good (on the horizontal axis) as a function of income (on the vertical axis).

Answer: C
Diff: 1
Section: 4.1

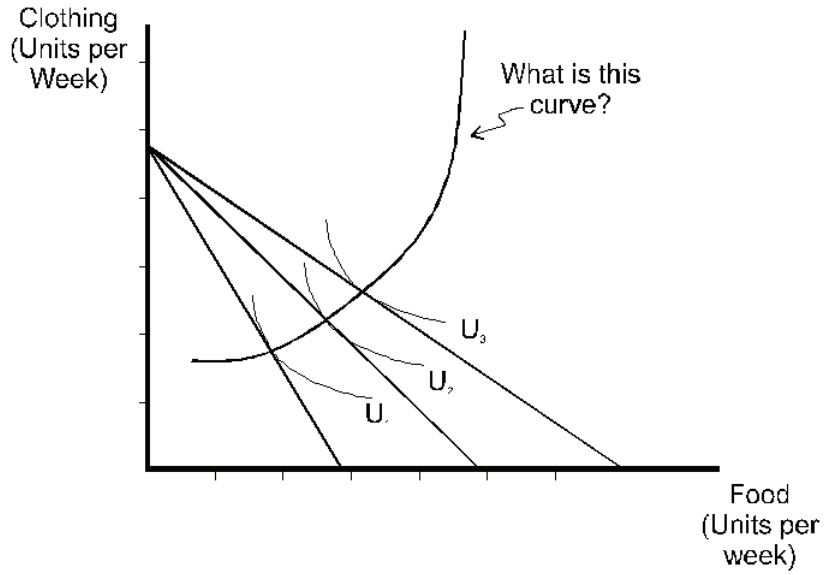
9) Which of the following pairs of goods are NOT complements?
A) Hockey sticks and hockey pucks
B) Computer CPUs and computer monitors
C) On–campus student housing and off–campus rental apartments
D) all of the above
E) none of the above

Answer: C
Diff: 1
Section: 4.1

10) Which of the following goods has a low, but positive, income elasticity of demand?
A) furniture.
B) new cars.
C) health insurance.
D) all of the above
E) none of the above

Answer: C
Diff: 1
Section: 4.1

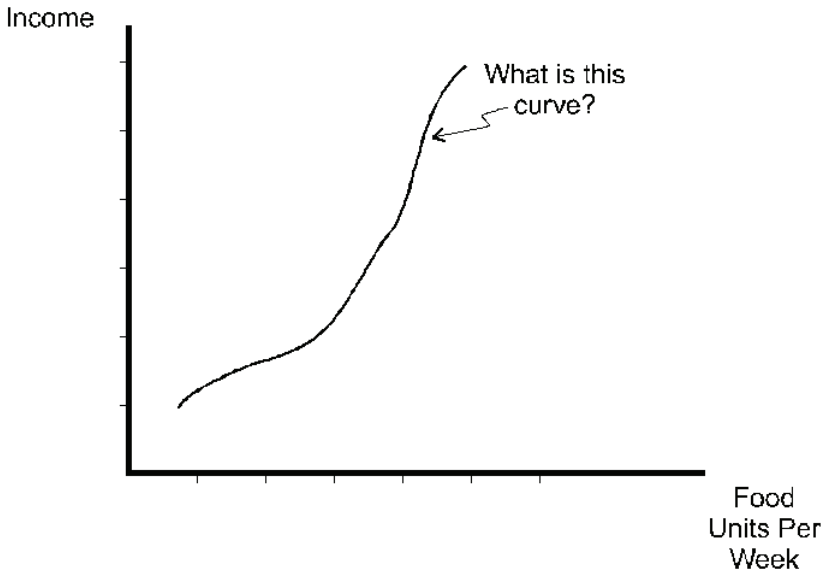
11) The curve in the diagram below is called



A) the price–consumption curve.
B) the demand curve.
C) the income–consumption curve.
D) the Engel curve.
E) none of the above

Answer: A
Diff: 1
Section: 4.1

12) The curve in the diagram below is called:



A) the price–consumption curve.
B) the demand curve.
C) the income–consumption curve.
D) the Engel curve.
E) none of the above

Answer: D
Diff: 1
Section: 4.1

13) If an Engel curve has a positive slope
A) both goods are normal.
B) the good on the horizontal axis is normal
C) as the price of the good on the horizontal axis increases, more of both goods in consumed.
D) as the price of the good on the vertical axis increases, more of the good on the horizontal axis is consumed.

Answer: B
Diff: 1
Section: 4.1

14) Which of the following pairs of goods are substitutes?
A) Baseball bats and baseballs
B) Hot dogs and mustard
C) Computer hardware and software
D) Gasoline and motor oil
E) Owner–occupied housing and rental housing

Answer: E
Diff: 1
Section: 4.1

15) When the income–consumption curve has a positive slope throughout its entire length, we can conclude that
A) both goods are inferior.
B) both goods are normal.
C) the good on the vertical (y) axis is inferior.
D) the good on the horizontal (x) axis is inferior.

Answer: B
Diff: 2
Section: 4.1

16) Use the following statements to answer this question:
I. A price–consumption curve is derived by varying the price of asparagus. If the price–consumption curve is an upward sloping straight line, the demand curve for asparagus must be downward sloping.
II. Fred consumes only food and clothing. Fred's Engel curve traces out the utility maximizing combinations of food and clothing associated with each and every income level.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: B
Diff: 2
Section: 4.1

17) Consider two goods X and Y available for consumption. Assume that the price of X changes while the price of Y remains fixed. For these two goods, the price–consumption curve illustrates the
A) relationship between the price of X and consumption of Y.
B) utility–maximizing combinations of X and Y for each price of X.
C) relationship between the price of Y and the consumption of X.
D) utility–maximizing combinations of X and Y for each quantity of X.

Answer: B
Diff: 2
Section: 4.1

18) Consider a graph on which one good Y is on the vertical axis and the only other good X is on the horizontal axis. On this graph the income–consumption curve has a positive slope for low incomes, then it takes a zero slope for a higher income, and then it takes a negative slope for even higher incomes (the curve looks like an arc, first rising and then falling as income increases). This curve illustrates that, for all income levels,
A) both X and Y are normal.
B) only Y is normal.
C) both X and Y are inferior.
D) only X is normal.

Answer: D
Diff: 2
Section: 4.1

19) According to a survey by the U.S. Bureau of Labor Statistics, which of the following statements about annual U.S. household consumer expenditures is false?
A) The income elasticity of demand for entertainment is positive.
B) The income elasticity of demand for owner–occupied housing is positive.
C) The income elasticity of demand for rental housing is positive.
D) The income elasticity of demand for health care is positive.
E) Average family expenditures increase with income.

Answer: C
Diff: 2
Section: 4.1

20) The income–consumption curve for Dana between Qa and Qb is given as: Qa = Qb. His budget constraint is given as:

$$120 = Qa + 4Qb$$

How much Qa will Dana consume to maximize utility?
A) 0
B) 24
C) 30
D) 60
E) More information is needed to answer this question.

Answer: B
Diff: 3
Section: 4.1

21) Jon's income–consumption curve is a straight line from the origin with a positive slope. Now suppose that Jon's preferences change such that his income–consumption curve remains a straight line but rotates 15 degrees clockwise. Jon's demand curve for the good on the horizontal axis
A) will shift left.
B) will shift right.
C) will not change.
D) might do any of the above.

Answer: B
Diff: 3
Section: 4.1

22) Suppose that a consumer regards two types of soap as perfect substitutes for one another. The price consumption path generated by changing the price of one type of soap
A) is always upward sloping.
B) is always horizontal.
C) is always vertical.
D) corresponds with the axis for the cheaper soap.
E) corresponds with the axis for the more expensive soap.

Answer: D
Diff: 3
Section: 4.1

23) Your income response for bicycle riding changes with the amount of income you earn. At low levels of income, you view bicycle riding as an inferior good and substitute other types of transportation (e.g., auto travel) as your income rises. However, you view bicycle riding as a normal good after your income rises above a particular level. What shape does your Engel curve for bicycle riding have?

A) Vertical line
B) Horizontal line
C) C–shaped
D) Upward sloping
E) none of the above

Answer: A
Diff: 1
Section: 4.1

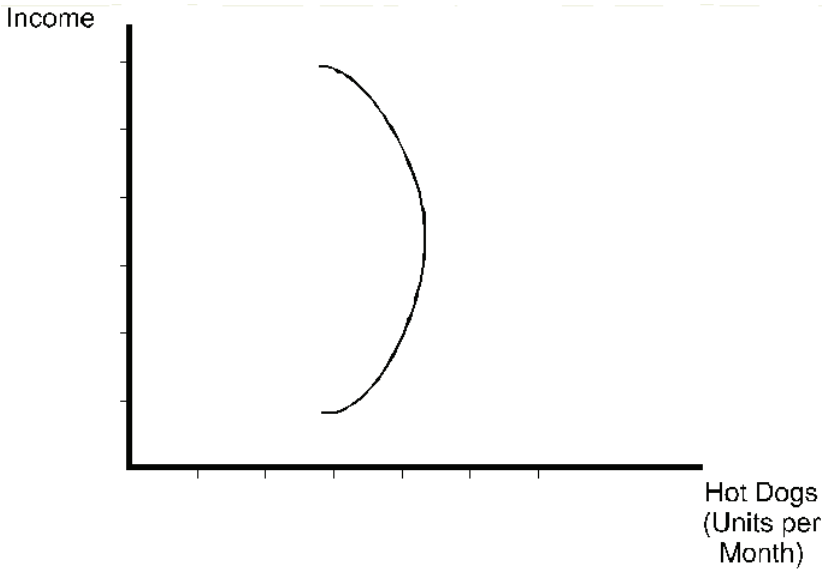
24) Use the following statements to answer this question:

I. The income–consumption curve for perfect complements is a straight line.
II. The price–consumption curve for perfect complements is a straight line.

A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: A
Diff: 2
Section: 4.1

25) Based on the diagram below it can be inferred that:



A) hot dogs are a normal good for all levels of income.
B) hot dogs are an inferior good, but not a Giffen good, for all levels of income.
C) hot dogs are a Giffen good for all levels of income.
D) hot dogs are an inferior good for low levels of income, but at higher levels of income become a normal good.
E) none of the above

Answer: E
Diff: 2
Section: 4.2

26) Good A is a normal good. The demand curve for good A:
A) slopes downward.
B) usually slopes downward, but could slope upward.
C) slopes upward.
D) usually slopes upward, but could slope downward.

Answer: A
Diff: 1
Section: 4.2

27) Use the following two statements in answering this question:
I. All Giffen goods are inferior goods.
II. All inferior goods are Giffen goods.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II true.
D) I and II are false.

Answer: B
Diff: 1
Section: 4.2

28) The change in the quantity demanded of a good resulting from a change in relative price with the level of satisfaction held constant is called the _____ effect.
A) Giffen
B) real price
C) income
D) substitution

Answer: D
Diff: 1
Section: 4.2

29) For an inferior good, the income and substitution effects
A) work together.
B) work against each other.
C) can work together or in opposition to each other depending upon their relative magnitudes.
D) always exactly cancel each other.

Answer: B
Diff: 1
Section: 4.2

30) The substitution effect of a price change for product X is the change in consumption of X associated with a change in
A) the price of X, with the level of utility held constant.
B) the price of X, with the level of real income not considered.
C) the price of X, with the prices of other goods changing by the same percentage as that for product X.
D) income, with prices of other goods held constant.

Answer: A
Diff: 1
Section: 4.2

31) A Giffen good
A) is always the same as an inferior good.
B) is the special subset of inferior goods in which the substitution effect dominates the income effect.
C) is the special subset of inferior goods in which the income effect dominates the substitution effect.
D) must have a downward sloping demand curve.

Answer: C
Diff: 1
Section: 4.2

32) Which of the following is true concerning the substitution effect of a decrease in price?
A) It will lead to an increase in consumption only for a normal good.
B) It always will lead to an increase in consumption.
C) It will lead to an increase in consumption only for an inferior good.
D) It will lead to an increase in consumption only for a Giffen good.

Answer: B
Diff: 1
Section: 4.2

33) Which of the following is true concerning the income effect of a decrease in price?
A) It will lead to an increase in consumption only for a normal good.
B) It always will lead to an increase in consumption.
C) It will lead to an increase in consumption only for an inferior good.
D) It will lead to an increase in consumption only for a Giffen good.

Answer: A
Diff: 1
Section: 4.2

34) Which of the following describes the Giffen good case? When the price of the good
A) rises, the income effect is opposite to and greater than the substitution effect, and consumption falls.
B) falls, the income effect is in the same direction as the substitution effect, and consumption rises.
C) falls, the income effect is in the opposite direction to the substitution effect, and consumption falls.
D) falls, the income effect is in opposite direction to the substitution effect and consumption rises.
E) Both A and D are correct.

Answer: C
Diff: 3
Section: 4.2

35) Use the following two statements in answering this question:
I. For all Giffen goods the substitution effect is larger than the income effect.
II. For all inferior goods the substitution effect is larger than the income effect.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: D
Diff: 2
Section: 4.2

36) Assume that beer is a normal good. If the price of beer rises, then the substitution effect results in the person buying _____ of the good and the income effect results in the person buying _____ of the good.
A) more, more B) more, less C) less, more D) less, less

Answer: D
Diff: 2
Section: 4.2

37) Assume that beer is an inferior good. If the price of beer falls, then the substitution effect results in the person buying _____ of the good and the income effect results in the person buying _____ of the good.
A) more, more B) more, less C) less, more D) less, less

Answer: B
Diff: 2
Section: 4.2

38) Good A is an inferior good. If the price of good A were to suddenly double, the substitution effect would cause the purchases of good A to increase by
A) more than double.
B) exactly double.
C) less than double.
D) Any of the above are possible.
E) none of the above

Answer: E
Diff: 2
Section: 4.2

39) Good A is a Giffen good. If the price of good A were to suddenly double, the income effect would cause the purchases of good A to increase by
A) more than double.
B) exactly double.
C) less than double.
D) Any of the above are possible.
E) none of the above

Answer: D
Diff: 2
Section: 4.2

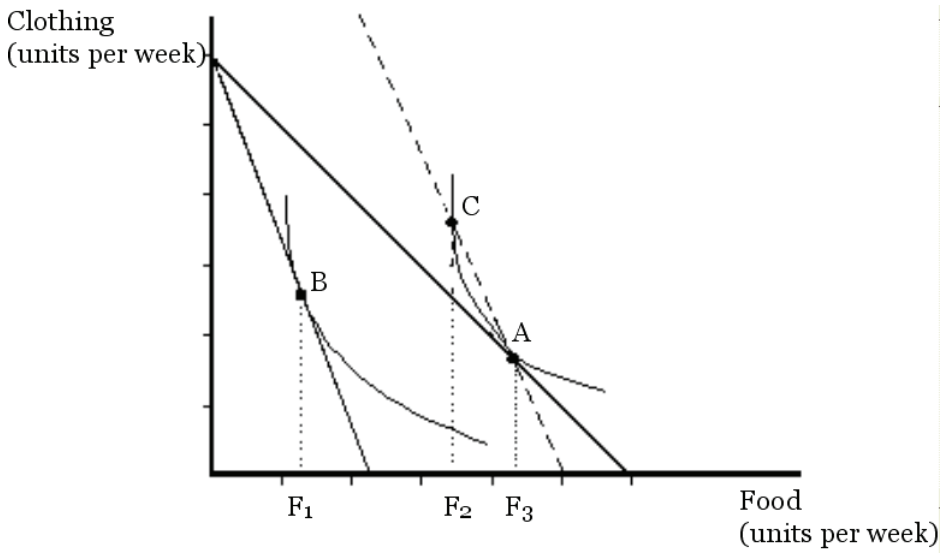


Figure 4.1

A consumer's original utility maximizing market basket of goods is shown in Figure 4.1 as point A. Following a price change, the consumer's utility maximizing market basket changes is at point B.

40) Refer to Figure 4.1. The substitution effect of the price change in food on the quantity of food purchased is:
A) the change from F3 to F1.
B) the change from F3 to F2.
C) the change from F2 to F1.
D) the change from F1 to F2.
E) none of the above

Answer: B
Diff: 2
Section: 4.2

41) Refer to Figure 4.1. The income effect of the price change in food on the quantity of food purchased is:
A) the change from F3 to F1.
B) the change from F3 to F2.
C) the change from F2 to F1.
D) the change from F1 to F2.
E) none of the above

Answer: C
Diff: 2
Section: 4.2

42) Based on Figure 4.1, food is:
A) a normal good.
B) an inferior good, but not a Giffen good.
C) a Giffen good.
D) none of the above

Answer: A
Diff: 2
Section: 4.2

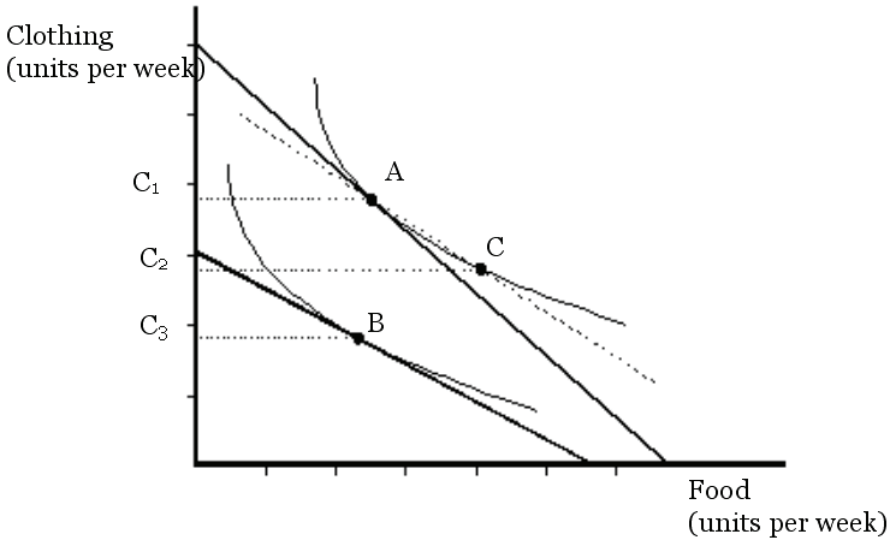


Figure 4.2

A consumer's original utility maximizing market basket of goods is shown in Figure 4.2 as point A. Following a price change, the consumer's utility maximizing market basket is at point B.

43) Refer to Figure 4.2. The substitution effect on the quantity of clothing purchased is:
A) the change from C3 to C1.
B) the change from C3 to C2.
C) the change from C2 to C1.
D) the change from C1 to C2.
E) none of the above

Answer: D
Diff: 2
Section: 4.2

44) Refer to Figure 4.2. The income effect on the quantity of clothing purchased is:
A) the change from C1 to C3.
B) the change from C1 to C2.
C) the change from C2 to C3.
D) the change from C3 to C2.
E) none of the above

Answer: C
Diff: 2
Section: 4.2

45) Based Figure 4.2, clothing is:
A) a normal good.
B) an inferior good, but not a Giffen good.
C) a Giffen good.
D) none of the above

Answer: A
Diff: 2
Section: 4.2

Scenario 4.1:
Daniel derives utility from only two goods, cake (Qc) and donuts (Qd). The marginal utility that Daniel receives from cake (MUc) and donuts (MUd) are given as follows:
MUc = Qd MUd = Qc
Daniel has an income of $240 and the price of cake (Pc) and donuts (Pd) are both $3.

46) See Scenario 4.1. What is Daniel's budget constraint?
A) 240 = 3Pc + 3Pd
B) 240 = 3Qc + 3Qd
C) 240 = (Pc)(Qc)
D) 240 = (Qc)(Qd)
E) none of the above

Answer: B
Diff: 2
Section: 4.2

47) See Scenario 4.1. What is Daniel's income–consumption curve?
A) Pc = Pd
B) Pc = Qc
C) Qd = I – 3Qc
D) Qc = Qd
E) all of the above

Answer: D
Diff: 3
Section: 4.2

48) See Scenario 4.1. What quantity Qc will maximize Daniel's utility given the information above?
A) 0
B) 24
C) 40
D) 60
E) none of the above

Answer: C
Diff: 3
Section: 4.2

49) See Scenario 4.1. Holding Daniel's income and Pd constant at $240 and $3 respectively, what is Daniel's demand curve for cake?
A) Qc = 240 – Pc
B) Qc = 240/Pc
C) Qc = 120/Pc
D) Qc = 240/(3 + Pc)
E) none of the above

Answer: D
Diff: 3
Section: 4.2

50) You have just won a cash award of $500 for academic excellence.
A) The substitution effect of this award will be larger than its income effect.
B) The income effect of this award will be larger than its substitution effect.
C) The substitution and income effects will be of identical size.
D) It is impossible to know whether the substitution effect is larger than the income effect or vice versa.

Answer: B
Diff: 3
Section: 4.2

51) The Russian government wants to reduce the consumption of vodka. A one hundred rouble tax on each bottle purchased may reduce the consumption of vodka under which circumstance(s)?
A) Vodka is an inferior good.
B) Vodka is a normal good.
C) Vodka is an inferior good and the taxes collected from this tax are rebated to consumers.
D) Vodka is a normal good and the taxes collected from this tax are rebated to consumers.
E) both B and C

Answer: E
Diff: 3
Section: 4.2

52) Suppose the price of rice increases and you view rice as an inferior good. The substitution effect results in a _____ change in rice consumption, and the income effect leads to a _____ change in rice consumption.
A) positive, positive
B) positive, negative
C) negative, positive
D) negative, negative

Answer: C
Diff: 1
Section: 4.2

53) You consume good X (horizontal axis) and good Y (vertical axis), and your indifference curves are vertical lines because you do not gain any satisfaction from consumption of Y. As the price of X declines, the change in consumption of X is entirely composed of the:
A) income effect.
B) substitution effect.
C) Giffen effect.
D) independent good effect.

Answer: A
Diff: 2
Section: 4.2

54) A consumer spends his income on food and rent. The government places a $1 tax on food. To restore the pre–tax consumption level of food the rebate paid to consumers will be smallest when
A) the own price elasticity of demand for food is 2, and the income elasticity of demand for food is 5.
B) the own price elasticity of demand for food is 5, and the income elasticity of demand for food is 5.
C) the own price elasticity of demand for food is 2, and the income elasticity of demand for food is 10.
D) the own price elasticity of demand for food is 5, and the income elasticity of demand for food is 10.

Answer: C
Diff: 3
Section: 4.3

55) Price elasticity of demand measures the
A) slope of the demand curve.
B) sensitivity of quantity demanded to changes in the price of substitute goods.
C) sensitivity of price to changes in the quantity demanded of substitute goods.
D) sensitivity of quantity demanded to changes in price.

Answer: D
Diff: 1
Section: 4.3

56) When a good is price inelastic, consumer expenditures on the good
A) increase when price increases.
B) decrease when price increases.
C) do not change when price increases.
D) are not related to price elasticity of demand.

Answer: A
Diff: 1
Section: 4.3

57) When a good has a unitary price elasticity, consumer expenditures for the good
A) change in the same direction as a price change.
B) change in the opposite direction to a price change, but not necessarily by the same percentage as the price change.
C) do not change when the price of the good decreases.
D) change in the opposite direction and by the same percentage as any price change.

Answer: C
Diff: 1
Section: 4.3

58) Recently, Skooterville has experienced a large growth in population. As a result, the demand curve for telephone service in Skooterville:
A) has shifted to the right.
B) has shifted to the left.
C) has shifted down.
D) Both B and C are correct.
E) none of the above

Answer: A
Diff: 1
Section: 4.3

59) The demand for sirloin steak is probably more elastic than the demand for all meat because
A) steak is very expensive.
B) people are worried about cholesterol.
C) cattle raising is not very profitable.
D) there are more substitutes for sirloin steak than for all meats.

Answer: D
Diff: 1
Section: 4.3

60) Which of the following is true about the demand for gasoline?
A) it is probably more price elastic in the long run because price will increase by a higher percentage.
B) it is probably more price elastic in the long run because it is easier to find substitutes for gasoline in the long run.
C) it is probably more price elastic in the short run because price will increase by a higher percentage.
D) it is probably more price elastic in the short run because it is easier to find substitutes for gasoline in the short run.

Answer: B
Diff: 1
Section: 4.3

61) In a recent article, two economists estimated that the 37.5% increase in price that would result from a 75 cent tax increase on cigarettes would lead to a decrease in smoking among college students of 30%. What can you conclude about the demand for cigarettes among college students?
A) It is price elastic.
B) It is price inelastic.
C) It is unit elastic.
D) It is perfectly inelastic.

Answer: B
Diff: 1
Section: 4.3

62) As the price of good X increases from $5 to $8, quantity demanded falls from 100 to 80. Based upon this information we can conclude that the demand for X is
A) elastic.
B) inelastic.
C) unit inelastic.
D) insufficient information for judgment.

Answer: B
Diff: 2
Section: 4.3

63) Use the following two statements to answer this question:
I. The price elasticity of demand is constant along the entire length of a linear demand curve.
II. The price elasticity of demand is the special name that economists give to the slope of a demand curve.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: D
Diff: 2
Section: 4.3

64) What is the shape of the total revenue curve derived from a linear downward sloping demand curve?
A) Horizontal
B) Vertical
C) U–shaped
D) Inverted u–shaped

Answer: D
Diff: 2
Section: 4.3

65) What is the shape of the total revenue curve derived from a horizontal demand curve?
A) Horizontal
B) Vertical
C) U–shaped
D) Upward sloping, with a positive slope

Answer: D
Diff: 2
Section: 4.3

66) What is the shape of the marginal revenue curve derived from a linear downward sloping demand curve?
A) Horizontal
B) Vertical
C) U–shaped
D) Downward sloping, with a constant slope

Answer: D
Diff: 3
Section: 4.3

67) Which of the following functions is least likely to represent a real demand curve?
A) Q = 120 – 2P
B) Q = 120 – 3P + 2I
C) Q = 120/P
D) Q = 120 + 3P – 2I
E) Q = 120/(Pa + Pb)

Answer: D
Diff: 2
Section: 4.3

Scenario 4.2:
Suppose that the demand for artichokes (Qa) is given as:

$$Qa = 200 - 4P$$

68) Use the information in Scenario 4.2. What is the price elasticity of demand if the price of artichokes is $10?
A) 0
B) –0.25
C) –1
D) –4
E) negative infinity

Answer: B
Diff: 2
Section: 4.3

69) Use the information in Scenario 4.2. Suppose that the price of artichokes is increased slightly from $10. The total expenditure by consumers on artichokes will _____ and the number of artichokes sold will _____.
A) rise, rise B) rise, fall C) fall, rise D) fall, fall

Answer: B
Diff: 2
Section: 4.3

70) Use the information in Scenario 4.2. At what price, if any, is the demand for artichokes completely elastic?
A) 50
B) 30
C) 10
D) 0
E) none of the above

Answer: A
Diff: 2
Section: 4.3

Scenario 4.3:
The demand for erasers (Q) is given as follows:

$$Q = 240 - 4Pe + 2I + Pb + A$$

where

Pe is the price of erasers.
I is the level of income.
Pb is the price of another good.
A is the level of advertising.

Suppose that Q = 240, Pe = 10, Pb = 10, and A = 2.

71) Given the information in Scenario 4.3, determine I.
A) 0 B) 14 C) 24 D) 36 E) 48

Answer: B
Diff: 2
Section: 4.3

72) Given the information in Scenario 4.3, what is the point price elasticity of demand?
A) –1/3 B) –1/6 C) –1/10 D) –1/24 E) –5/24

Answer: B
Diff: 2
Section: 4.3

73) Given the information in Scenario 4.3, it would be correct to say that demand is:
A) infinitely elastic.
B) elastic, but not infinitely elastic.
C) unit elastic (Ep = –1).
D) inelastic, but not completely inelastic.
E) completely inelastic.

Answer: D
Diff: 1
Section: 4.3

74) Given the information in Scenario 4.3, suppose that the price of erasers increases slightly from $10. How will this affect the total revenue collected by the firm?
A) Total revenue will increase.
B) Total revenue will not change.
C) Total revenue will decrease.
D) There will be an indeterminate change in total revenue.

Answer: A
Diff: 2
Section: 4.3

75) Given the information in Scenario 4.3, erasers are:
A) a normal good.
B) an inferior good.
C) neither normal nor inferior.
D) complements.
E) necessities.

Answer: A
Diff: 1
Section: 4.3

76) Given the information in Scenario 4.3, erasers and good b, are:
A) substitutes.
B) complements.
C) completely unrelated.
D) normal.
E) inferior.

Answer: A
Diff: 1
Section: 4.3

77) The point price elasticity of demand is –1/2. The price of the product increases from $1.00 to $1.10. Given the information in Scenario 4.3, the quantity demanded will decrease by approximately:
A) 5 units.
B) 5 percent.
C) 10 units.
D) 10 percent.
E) none of the above

Answer: B
Diff: 1
Section: 4.3

Scenario 4.4:
The demand curve for the new computer game, Rock and Roll Trivia, is given as follows:

$$Q = 200 - 5P - .1Pc - .5Pd + .2A - I$$

where

P is the price of the game,
Pc is the price of a computer
Pd is the price of a diskette
A is the level of advertising
Q is the level of income

78) See the information in Scenario 4.4. Does the demand curve for Rock and Roll Trivia slope downward?
A) Yes it does.
B) No it does not.
C) More information is needed to answer this question.

Answer: A
Diff: 1
Section: 4.3

79) See the information in Scenario 4.4. From this demand curve, one can infer that:
A) Rock and Roll Trivia is an inferior good.
B) computers and diskettes are substitutes.
C) computers and diskettes are complements.
D) computers are a normal good.
E) A, B and D are true.

Answer: A
Diff: 2
Section: 4.3

80) See the information in Scenario 4.4. From this demand curve, one can infer that:
A) an increase in advertising will cause an increase in the demand for Rock and Roll Trivia.
B) Rock and Roll Trivia and computers are substitutes.
C) Rock and Roll Trivia and diskettes are substitutes.
D) all of the above
E) none of the above

Answer: A
Diff: 2
Section: 4.3

81) See the information in Scenario 4.4. Suppose P = 10, Pc = 100, Pd = 2, A = 5, and I = 50. How many games will be sold?
A) –100
B) 0
C) 50
D) 90
E) none of the above

Answer: D
Diff: 2
Section: 4.3

82) See the information in Scenario 4.4. Suppose P = 10, Pc = 100, Pd = 2, A = 5, and I = 50. What is the price elasticity of demand?
A) 0
B) –5/9
C) –1
D) –9/5
E) none of the above

Answer: B
Diff: 2
Section: 4.3

83) See the information in Scenario 4.4. Suppose that the price should increase slightly from $10, how will this affect the total expenditure of consumers on the game?
A) Total expenditures will increase.
B) Total expenditures will not change.
C) Total expenditures will decrease by a larger percentage than the price increase.
D) Total expenditures will decrease by a smaller percentage than the price increase.
E) either C or D could be true.

Answer: A
Diff: 2
Section: 4.3

84) See the information in Scenario 4.4. Suppose P = 10, Pc = 100, Pd = 2, A = 5, and I = 50. What is the income elasticity of demand?
A) 0
B) 5/9
C) 1
D) 9/5
E) none of the above

Answer: E
Diff: 3
Section: 4.3

85) See the information in Scenario 4.4. Suppose P = 10, Pc = 100, Pd = 2, A = 5, and I = 50. What is the cross price elasticity of Rock and Roll Trivia programs and diskettes?
A) –1/90
B) 0
C) 1/90
D) 1
E) none of the above

Answer: A
Diff: 2
Section: 4.3

86) A local retailer has decided to carry a well–known brand of shampoo. The marketing department tells them that the quarterly demand by an average man is:

$$Qd = 3 - 0.25P$$

and the quarterly demand by an average woman is:

$$Qd = 4 - 0.5P$$

The market consists of 10,000 men and 10,000 women. How may bottles of shampoo can they expect to sell if they charge $6 per bottle?
A) 20,000
B) 33,000
C) 25,000
D) 10,000
E) none of the above

Answer: C
Diff: 2
Section: 4.3

87) General Motors estimates that U.S. demand for its newest product will be: Qus = 30,000 – 0.5P. Export demand will be Qex = 25,000 – 0.5P. The total market demand curve for this product will be a
A) straight line with a slope of –0.5.
B) straight line with a slope of –1.0.
C) kinked line with the kink at Q = 25,000.
D) kinked line with the kink at P = 50,000.
E) none of the above

Answer: D
Diff: 3
Section: 4.3

88) The point price elasticity of demand for red herring is –4. The demand curve for red herring is: Q = 120 – P. What is the price of red herring?
A) $96
B) $80
C) $100
D) $120
E) none of the above

Answer: A
Diff: 1
Section: 4.3

89) Consider the following statements when answering this question.
I. If no consumer has a kinked demand curve for CDs, then the market demand curve for CDs cannot be kinked either.
II. If at a price of $10, every consumer has inelastic demand, then at that price the market demand for CDs will be inelastic too.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: D
Diff: 3
Section: 4.3

90) To determine whether an increase in the price of gasoline results in a consumer spending a larger share of their expenditure on gasoline we need to know
A) only how much money the consumer spends on gasoline before the price change
B) only the change in the price of gasoline
C) only the change in the price of gasoline as a percentage of the original price
D) only the own price elasticity of demand for gasoline
E) none of the above

Answer: D
Diff: 2
Section: 4.3

91) Microsoft wants to calculate the effect of a worldwide 5% price cut on its sales of Excel to clients in different countries. Microsoft sells Excel at different prices in U.S., Japan and Europe. Before the price cut U.S. sales were twice sales in Japan and Europe. If the price of elasticity of demand in the U.S., Japan and Europe are –3, –4, and –2 respectively, the worldwide sales rise by
A) 10%.
B) 15%.
C) 20%.
D) 25%.
E) none of the above

Answer: B
Diff: 3
Section: 4.3

92) Gold buyers are located in New York and Zurich. At the current price of gold, $400 an ounce, worldwide demand for gold is 10,000 ounces; and the price elasticity of demand for gold in New York and Zurich are –3 and –2 respectively. If the slope of each demand curve in New York is the same as in Zurich, then the quantity of gold demanded by dealers in Zurich is
A) 10,000/3.
B) 5,000.
C) 6,000.
D) 10,000.
E) none of the above

Answer: C
Diff: 3
Section: 4.3

93) The demand curves for gold in New York and Zurich can both be represented by a line with negative slope, –b. When the price is zero the demand for gold is x ounces higher in New York than in Zurich. At the current price of gold the price elasticity of demand for gold in New York and Zurich is –3 and –4 respectively. The value of x equals
A) a quarter of the current demand for gold in New York
B) a third of the current demand for gold in New York
C) a half of the current demand for gold in New York
D) three–quarters of the current demand for gold in New York
E) none of the above

Answer: A
Diff: 3
Section: 4.3

94) Suppose your manufacturing firm is not a price–taking seller (i.e., has some control over your product price) and sells machinery to U.S. (domestic) buyers as well as foreign buyers. The domestic demand for your product is inelastic but the foreign demand is elastic, and the machinery is bulky so that the high transport costs prevent resale among the buyers. You could charge both groups of buyers the same price for the machinery, but you know that you could increase total sales revenue by charging the domestic buyers a _____ price and charging the foreign customers a _____ price.
A) higher, higher B) higher, lower C) lower, higher D) lower, lower

Answer: B
Diff: 2
Section: 4.3

95) Many governments around the world attempt to improve the incomes of commodity producers by taking steps to increase the commodity price in the domestic market. Although this may reduce quantity demanded for the product, the action may be effective because:
A) commodity supply tends to be inelastic, so quantity does not decline by much.
B) commodity supply tends to be elastic, so producer income increases as a result of the higher prices and quantities.
C) commodity demand tends to be inelastic, so higher prices generate higher sales revenue.
D) commodity supply tends to be elastic, so producer income increases as a result of the higher prices and quantities.

Answer: C
Diff: 2
Section: 4.3

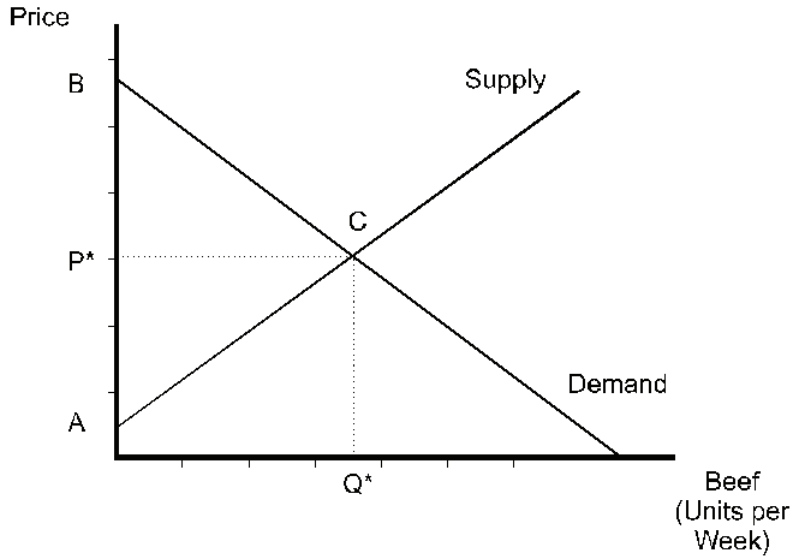
96) The difference between what a consumer is willing to pay for a unit of a good and what must be paid when actually buying it is called
A) producer surplus. B) consumer surplus.
C) cost benefit analysis. D) net utility.

Answer: B
Diff: 1
Section: 4.4

97) The area below the demand curve and above the price line measures
A) consumer surplus.
B) economic profit.
C) elasticity of demand.
D) the total value obtained from consuming the good or service.

Answer: A
Diff: 1
Section: 4.4

98) The price of beef and quantity of beef traded are P* and Q*, respectively. Given this information, consumer surplus is the area:



A) 0BCQ* B) ABC C) ACP* D) CBP* E) 0ACQ*

Answer: D
Diff: 1
Section: 4.4

99) When the price of wood (which is an input in the production of furniture) falls, the consumer surplus associated with the consumption of furniture
A) increases.
B) decreases.
C) does not change.
D) could be any of the above.

Answer: A
Diff: 2
Section: 4.4

100) The demand curve for tickets to the George Winston concert (with special guest star, Kenny G) is given as follows:

$Q = 200 - 0.1P$

At a price of $30, what is the consumer surplus from concert tickets?
A) $0 B) $20 C) $2,000 D) $1,970 E) $194,045

Answer: E
Diff: 3
Section: 4.4

101) A consumer's demand for CDs can be represented by a line with slope –b and intercept a. If the current price of CDs is $P, then the ratio of consumer surplus to total expenditures on CDs equals
A) (a – P)(a – bP).
B) 1/2(a – P)(a – bP).
C) D(a – bP).
D) (a – P)/P.
E) (a/b – P)/(2P).

Answer: E
Diff: 3
Section: 4.4

102) In closing down a military base, environmental inspectors found 100 tons of toxic waste. Which of the following is NOT a determinant of the consumer surplus generated by cleaning up 40 tons of waste?
A) The price of removing a ton of toxic waste
B) The original quantity of toxic waste found by the inspectors
C) The quantity of toxic waste removed by cleanup
D) The effect of each ton reduction of toxic waste on the profitability of the alternative uses for this land
E) The effect of each ton reduction of toxic waste on the health of citizens living near the base

Answer: B
Diff: 2
Section: 4.4

103) The price of video cassette recorders (VCRs) remains constant, but the market demand curve for VCRs shifts leftward as consumers shift to DVDs and other video technologies. What happens to the consumer surplus in this market as the demand curve shifts?
A) Increases
B) Decreases
C) Remains the same
D) We do not have enough information to answer this question.

Answer: B
Diff: 1
Section: 4.4

104) Suppose the market demand curve for hourly dial–up internet service is completely elastic. At the market equilibrium price under perfect competition, the consumer surplus in this market equals:
A) total consumer expenditures.
B) total sales revenue.
C) zero.
D) an amount slightly more than total consumer expenditure.

Answer: C
Diff: 1
Section: 4.4

105) Consider a particular market–clearing price and quantity under a perfectly competitive equilibrium. As the demand curve at this point becomes more inelastic, the consumer surplus in the market tends to:
A) increase.
B) decrease.
C) remain the same.
D) We do not have enough information to answer this question.

Answer: A
Diff: 1
Section: 4.4

106) Suppose the major soft drink companies develop vending machines for canned and bottled drinks that can determine your maximum willingness–to–pay for a drink, and the machine charges you that price when you purchase a drink. If this were possible, the consumer surplus in the vended soft drink market would be:
A) positive because consumer surplus equals consumer expenditures in this case.
B) positive because the market demand curve is perfectly inelastic in this case.
C) negative because people are not actually willing to pay their maximum value for the product.
D) zero because all surplus value is captured by the seller.

Answer: D
Diff: 2
Section: 4.4

107) When negative network externalities are present
A) the demand curve is more elastic than otherwise.
B) the demand curve is less elastic than otherwise.
C) the demand curve shifts to the right.
D) the demand curve shifts to the left.

Answer: B
Diff: 1
Section: 4.5

108) The bandwagon effect corresponds best to which of the following?
A) Snob effect
B) External economy
C) Negative network externality
D) Positive network externality

Answer: D
Diff: 1
Section: 4.5

109) Which of these is an example of a negative network externality?
A) Bandwagon effect
B) Pollution
C) Snob effect
D) Two–part tariff

Answer: C
Diff: 1
Section: 4.5

110) The snob effect corresponds best to a
A) negative network externality.
B) Giffen good.
C) positive network externality.
D) bandwagon effect.

Answer: A
Diff: 1
Section: 4.5

111) When the bandwagon effect exists, a change in price is likely to
A) change total revenue less than if there were no network externalities.
B) change total revenue more than if there were no network externalities.
C) change total revenue the same amount as if there were no network externalities.
D) not change total revenue at all.

Answer: B
Diff: 1
Section: 4.5

112) When the snob effect exists, a change in price is likely to
A) change total revenue less than if there were no network externalities.
B) change total revenue more than if there were no network externalities.
C) change total revenue the same amount as if there were no network externalities.
D) not change total revenue at all.

Answer: A
Diff: 1
Section: 4.5

113) As more and more firms have acquired fax machines, the fax machine has become a standard means of business communication. The increase in demand for fax machines for business communication:
A) is an example of the snob effect.
B) proves that the fax machine is an inferior good.
C) proves that the fax machine is a luxury good.
D) is an example of a positive network externality.
E) is an example of a negative network externality.

Answer: D
Diff: 1
Section: 4.5

114) Which of the following goods may have demand that is potentially affected by the bandwagon effect?
A) Satellite radio
B) Cellular telephones
C) High-definition (HD) televisions
D) Electronic book readers
E) all of the above

Answer: E
Diff: 1
Section: 4.5

115) Due to the bandwagon effect, demand for some products is _____ elastic than it would be without the positive network externality.

A) more
B) less
C) equally
D) more strongly unitary

Answer: A
Diff: 1
Section: 4.5

116) Use the following statements to answer this question:

I. A network externality is a situation in which each individual's demand depends on the purchases of other buyers.

II. Network externalities are mainly positive effects resulting from the actions of others, while ordinary externalities are mainly negative effects resulting from the actions of others.

A) I and II are true.
B) I is true and II is false.
C) I is false and II is true.
D) I and II are false.

Answer: B
Diff: 1
Section: 4.5

117) Some luxury product manufacturers will purposefully raise prices on their goods in order to reduce sales volume. This strategy may successfully increase sales revenue if the luxury goods are subject to the _____ effect and have relatively _____ demand.

A) bandwagon, elastic
B) bandwagon, inelastic
C) snob, elastic
D) snob, inelastic

Answer: D
Diff: 2
Section: 4.5

118) If an Engel curve has a negative slope,

A) the good is inferior.
B) the good is normal.
C) the good has no substitutes.
D) the good has no complements.

Answer: A
Diff: 1
Section: 4.6

119) Assume that we have a demand curve of the form:

$$\log(Q) = a - b \log(P) + c \log(I)$$

where Q = quantity, P = price, I = income, and a, b, and c are positive constants. The income and price elasticities for the demand curve represented above are always

A) equal to one.
B) equal to zero.
C) equal (i.e., income elasticity always equals price elasticity).
D) constant but not necessarily equal to one another.

Answer: D
Diff: 1
Section: 4.6

Scenario 4.5:
The demand curve for grilled cheese sandwiches has been estimated using statistical techniques as follows:

$$\log(Q) = -1.10 - 0.18\log(P) + 1.21\log(I) + 0.84\log(Ph)$$

where Q is the quantity of grilled cheese sandwiches
P is the price of grilled cheese sandwiches
I is income
Ph is the price of hamburgers

120) See Scenario 4.5. If P = $1,000, the price elasticity of demand:
A) is 0,
B) is negative infinity.
C) is –0.18.
D) cannot be determined without knowing I and Ph.

Answer: C
Diff: 2
Section: 4.6

121) See Scenario 4.5. As the price of grilled cheese sandwiches decreases, the price elasticity of demand:
A) increases.
B) does not change.
C) decreases.
D) none of the above

Answer: B
Diff: 2
Section: 4.6

122) See Scenario 4.5. The Engel curve for grilled cheese sandwiches is:
A) downward sloping.
B) horizontal.
C) upward sloping.
D) none of the above

Answer: C
Diff: 2
Section: 4.6

123) Scenario 4.5 indicates that grilled cheese sandwiches and hamburgers are:
A) substitutes.
B) complements.
C) independent goods.
D) none of the above

Answer: A
Diff: 2
Section: 4.6

124) Which of the following algebraic forms for a demand curve yields an isoelastic demand curve?
A) $Q = a - b\log(P) + c\log(I)$
B) $Q = a - bP + cI$
C) $\log(Q) = a - b\log(P) + c\log(I)$
D) $\log(Q) = bP + cI$

Answer: C
Diff: 3
Section: 4.6

125) Another commonly used algebraic form for a demand function is the semi–logarithmic functional form, $\ln(Q) = a - bP + cI$, where Q is quantity demanded, P is the product price, and I is income. Here, c represents the percentage change in quantity demanded given a one unit increase in income. For a normal good, we should expect the value of c to be:
A) positive.
B) negative.
C) positive or negative.
D) We do not have enough information to answer this question.

Answer: A
Diff: 1
Section: 4.6

126) Another commonly used algebraic form for a demand function is the semi–logarithmic functional form, $\log(Q) = a - bP + cI$, where Q is quantity demanded, P is the product price, and I is income. Here, –b represents the percentage change in quantity demanded given a one unit increase in price. By the Law of Demand, we should expect the value of b to be:
A) positive.
B) negative.
C) positive or negative.
D) We do not have enough information to answer this question.

Answer: A
Diff: 2
Section: 4.6

127) Suppose we believe the income response for hamburger consumption is positive (normal) at low income levels but becomes negative (inferior) at high income levels. Is the log–linear demand function a good choice for this particular product?
A) Yes, the log–linear model has an income elasticity that can be positive or negative.
B) No, the log–linear model has a constant income elasticity that cannot change with the income level.
C) No, the Engel curves for this case are vertical lines, and this behavior cannot be represented with the log–linear demand function.
D) none of the above

Answer: B
Diff: 2
Section: 4.6

128) Which of the following demand functions represents a price elasticity of demand equal to –0.33 and an income elasticity of demand equal to 0.8 at all points along the curve?
A) $Q = 3 - 0.33P + 0.8I$
B) $Q = 4.5 - 0.33\log(P) + 0.8I$
C) $\log(Q) = 1.34 - 0.33\log(P) + 0.8I$
D) $\log(Q) = 2.34 - 0.33\log(P) + 0.8\log(I)$

Answer: D
Diff: 2
Section: 4.6

129) A mathematical technique used to solve constrained optimization problems (finding the consumer optimum, for example) is:
A) the method of Lagrange multipliers.
B) the Cobb–Douglas method.
C) the Slutsky method.
D) the Hicks substitution method.

Answer: A
Diff: 1
Section: Appendix to Chapter 4

130) You have just found the consumer's optimal combination of goods using constrained optimization. The marginal utility of income is the:
A) Cobb–Douglas statistic.
B) Hicks factor.
C) Slutsky equation.
D) Lagrange multiplier.

Answer: D
Diff: 2
Section: Appendix to Chapter 4

131) The Slutsky equation is a mathematical representation of:
A) a utility function.
B) the marginal utility of income.
C) a demand curve.
D) the income expansion path.
E) the substitution and income effects.

Answer: E
Diff: 2
Section: Appendix to Chapter 4

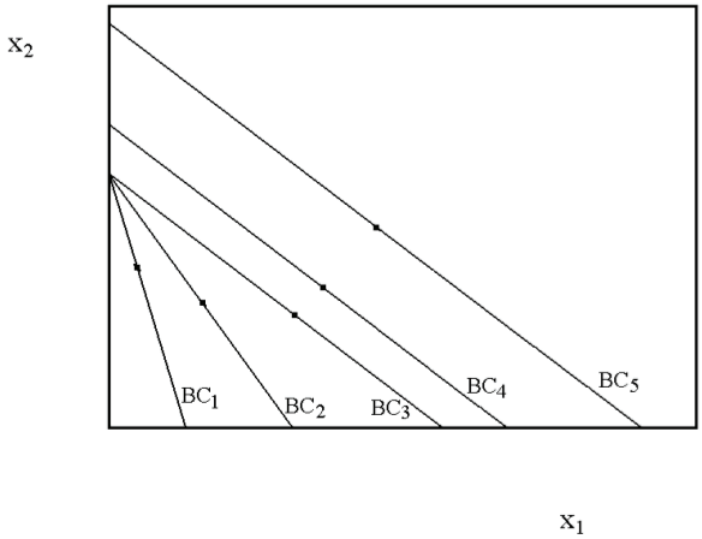
132) The dual approach to the consumer's problem is to choose:
A) the highest indifference curve that just touches the budget line.
B) the least–cost budget line required to achieve a given level of utility (satisfaction).
C) the maximum income required to achieve a given level of utility (satisfaction).
D) all of the above

Answer: B
Diff: 2
Section: Appendix to Chapter 4

133) By the method of Lagrange multipliers, the optimal value of the Lagrange multiplier equals the:
A) marginal utility of income.
B) marginal utility of each good.
C) marginal utility per dollar spent on the last unit of each good.
D) A and B above
E) A and C above

Answer: E
Diff: 2
Section: Appendix to Chapter 4

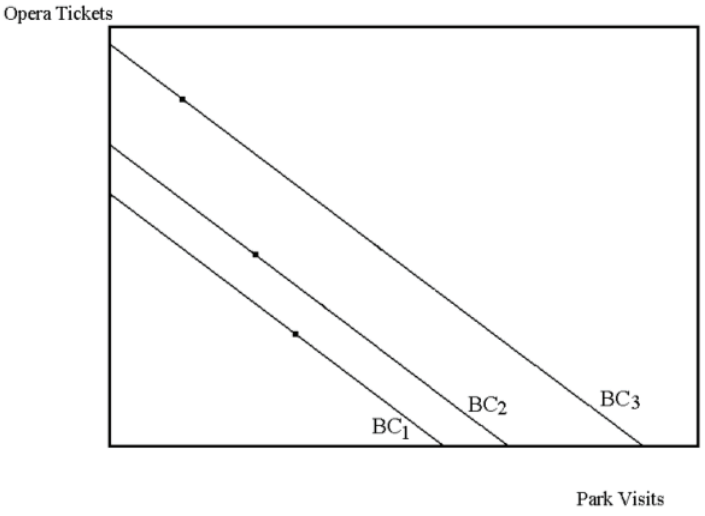
134) In the diagram below, Marvin's optimal consumption bundles are indicated for five different budget constraints. Sketch the Engel curve for Marvin. Next, use the diagram to sketch Marvin's demand curve for the good on the horizontal axis.



Answer: To construct the Engel curve, the relevant budget constraints are 3, 4 and 5. The Engel curve will be increasing in income and quantity space. To construct the demand curve, the relevant budget constraints are 1,2 and 3. Demand for good 1 increases as the price decreases.

Diff: 2
Section: 4.1

135) Melissa's optimal consumption is indicated in the diagram below for three different income levels. For Melissa are park visits a normal or inferior good? Explain your answer.



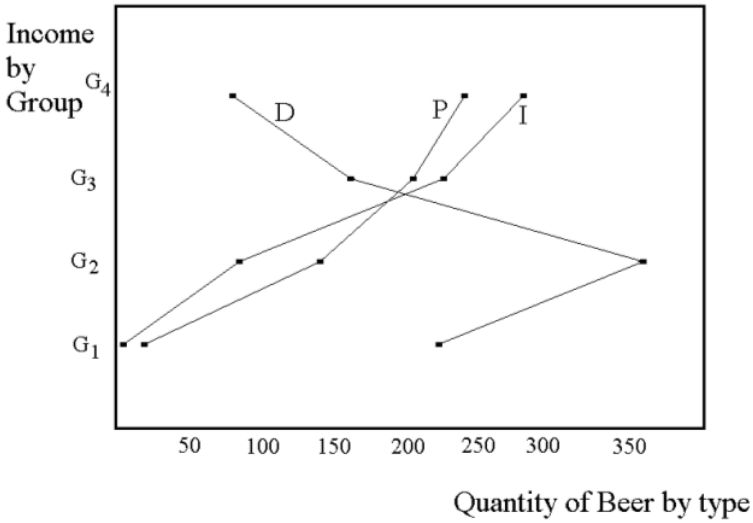
Answer: Melissa's demand behavior exhibited above suggests that as her income rises, she demands fewer park visits. Since the income effect is negative, park visits are an inferior good for Melissa.

Diff: 1
Section: 4.1

136) Using the table below, construct an Engel Curve for each beer type.

Beer Type	Income Group			
	Less than $20,000	$20,000 to $40,000	$40,000 to $60,000	$60,000 to $100,000
Domestic Beer	220	360	160	80
Premium Domestic Beer	20	140	200	240
Imported Beer	12	85	225	280

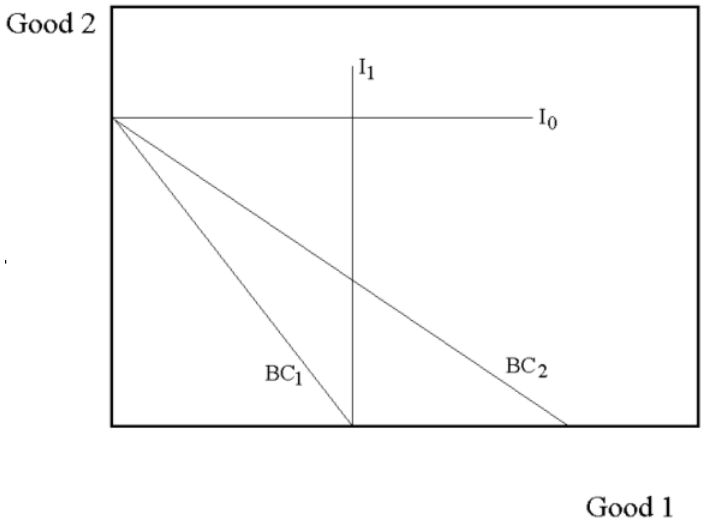
Answer:



Diff: 1
Section: 4.1

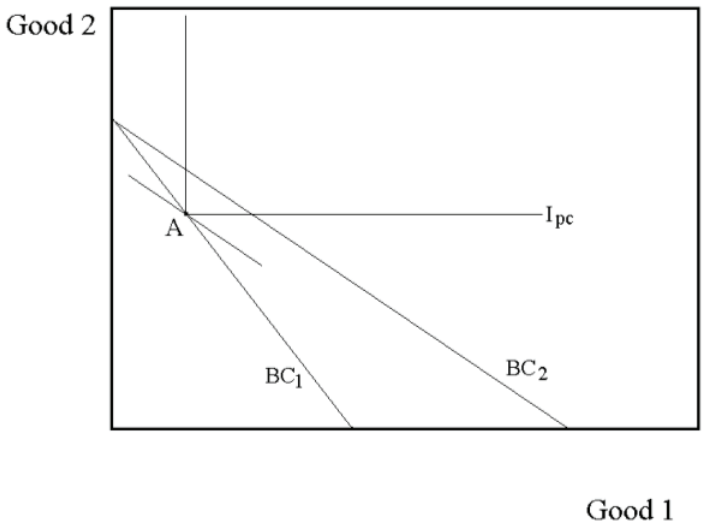
137) If the marginal rate of substitution is infinite or zero, show that the substitution effect of a price change for a good is zero.

Answer:



Suppose that the consumer has budget constraint BC1 shown above. If the consumer's MRS is infinite as indicated above as I1, the optimal bundle involves consuming a positive quantity of only good 1. If the price of good 1 falls, the consumer's new budget constraint becomes BC2. The optimal consumption bundle at new prices holding utility constant at I1 is the same. Thus, there is no substitution effect.

If the consumer's MRS is zero as indicated above on indifference curve I0, the optimal bundle involves consuming a positive quantity of only good 2. If the price of good 1 falls, the consumer's new budget constraint again becomes BC2. On this new budget constraint, the optimal bundle does not change. Thus, there is no substitution or income effect.



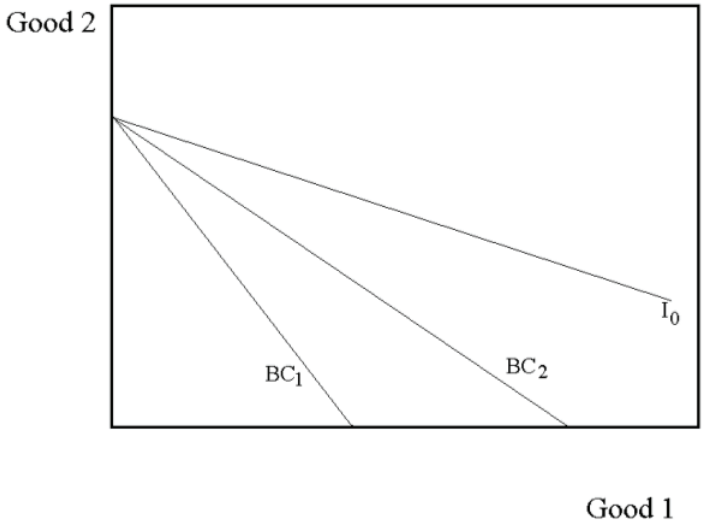
Another possibility is to have certain portions of the indifference curve exhibit either zero or infinite MRS as indicated directly above. The indifference curve Ipc suggests the goods are perfect complements. At initial prices, the consumer's optimal choice is at

point A on BC1 and Ipc. When the price of good 1 falls, we see that the optimal consumption bundle holding utility constant at new prices doesn't change. Thus, there is no substitution effect.

Diff: 3
Section: 4.2

138) Suppose the marginal rate of substitution is constant at 6 for all possible consumption bundles. Next suppose that the price of good 1 decreases, and the ratio P1/P2 is greater than 6. Show that the income and substitution effects from this price change are both zero.

Answer:



When the price of good 1 falls, the price ratio is still greater than 6 and the slope of the new budget constraint (BC2) must be flatter than the slope of the original budget constraint (BC1). Since the MRS is exactly 6, the consumer maximizes utility by consuming as much of good 2 as possible. After the price change, the consumer chooses the same bundle. Thus, the substitution and income effects are both zero in this example.

Diff: 2
Section: 4.2

139) Donald derives utility from only two goods, carrots (Qc) and donuts (Qd). His utility function is as follows:

U(Qc,Qd) = (Qc)(Qd)

The marginal utility that Donald receives from carrots (MUc) and donuts (MUd) are given as follows:

MUc = Qd MUd = Qc

Donald has an income (I) of $120 and the price of carrots (Pc) and donuts (Pd) are both $1.

a. What is Donald's budget line?
b. What is Donald's income–consumption curve?
c. What quantities of Qc and Qd will maximize Donald's utility?
d. Holding Donald's income and Pd constant at $120 and $1 respectively, what is Donald's demand curve for carrots?
e. Suppose that a tax of $1 per unit is levied on donuts. How will this alter Donald's utility maximizing market basket of goods?
f. Suppose that, instead of the per unit tax in (e), a lump sum tax of the same dollar amount is levied on Donald. What is Donald's utility maximizing market basket?
g. The taxes in (e) and (f) both collect exactly the same amount of revenue for the government, which of the two taxes would Donald prefer? Show your answer numerically and explain why Donald prefers the per unit tax over the lump sum tax, or vice versa, or why he is indifferent between the two taxes.

Answer: ***a.***

Budget line: 120 = Qc + Qd

b.

The income consumption curve must satisfy:

MUd/MUc = Pd/Pc

Substituting for MUd, MUc, Pd, and Pc yields:

Qc/Qd = 1 or Qc = Qd

c.

Substituting the information in (b) into the budget line:

120 = Qc + Qc = 2Qc
Qc = 60
Qd = 60

d.

Rewriting the budget line:

120 = PcQc + Qd

Substituting the information in (b) into the budget line:

120 = PcQc + Qc = Qc(Pc + 1)
Qc = 120/(Pc + 1)

e.

The $1 tax on donuts raises the after–tax price to $2. The income–consumption curve becomes:

MUd/MUc = Pd/Pc

Substituting for MUd, MUc, Pd and Pc yields:

Qc/Qd = 2 or Qc = 2Qd

The budget line is:

120 = Qc + 2Qd

Substitute the income–consumption curve into the budget line to eliminate Qc:

120 = 2Qd + 2Q = 4Qd

Qd = 30

Qc = 60

f.

Donald buys 30 donuts, so he pays $30 in tax. If Donald paid $30 in a lump sum tax, his income would be $90. Resolve the utility maximization problem with I = 90, Pc = Pd = 1.

The utility maximizing market basket is Qc = Qd = 45.

g.

Donald prefers the lump–sum tax to the excise tax. Use the utility function to show which market basket is preferred.

U(Qc, Qd) = QcQd

lump–sum tax U(45, 45) = 45 × 45 = 2,025

excise tax U(60, 30) = 60 × 30 = 1,800

Diff: 3
Section: 4.2

140) The following data pertain to products A and B, both of which are purchased by Madame X. Initially, the prices of the products and quantities consumed are:

P_A = $10, Q_A = 3, P_B = $10, Q_B = 7.

Madame X has $100 to spend per time period. After a reduction in price of B, the prices and quantities consumed are:

P_A = $10, Q_A = 2.5, P_B = $5, Q_B = 15.

Assume that Madame X maximizes utility under both price conditions above. Also, note that if after the price reduction enough income were taken away from Madame X to put her back on the original indifference curve, she would consume this combination of A and B:

Q_A = 1.5, Q_B = 9

a. Determine the change in consumption rate of good B due to (1) the substitution effect and (2) the income effect.

b. Determine if product B is a normal, inferior, or Giffen good. Explain.

Answer: ***a.***

The total effect of the price change is the difference in the quantities before and after the price change, or 15 – 7 = 8. This change of 8 includes the income and substitution effects. The reduction in consumption that resulted from the reduction in income to put Madame X back on the original indifference curve represents the income effect. This difference is

15 – 9 = 6. The difference between 15 – 7 = 8 and

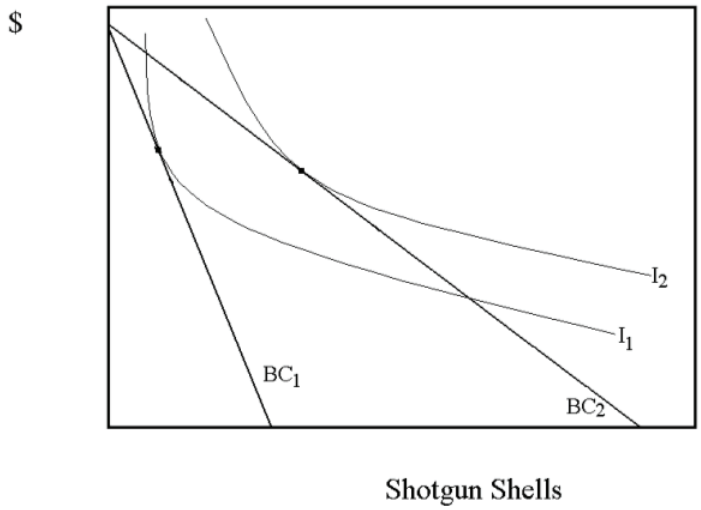
15 – 9 = 6 is the substitution effect, i.e. 8 – 6 = 2.

b.

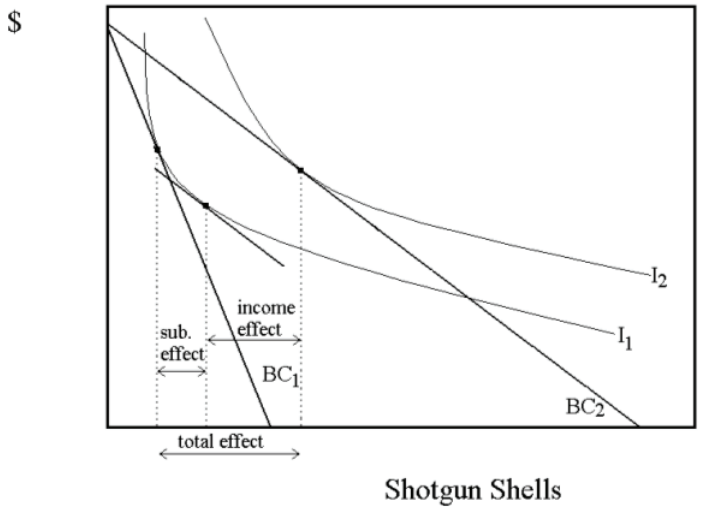
Since the two effects are additive and both are positive, we have a normal good, i.e., 6 + 2 = 8.

Diff: 3
Section: 4.2

141) The diagram below depicts the change in optimal consumption bundles for Marty when the price of shotgun shells fall. Decompose the change into the income and substitution effects.

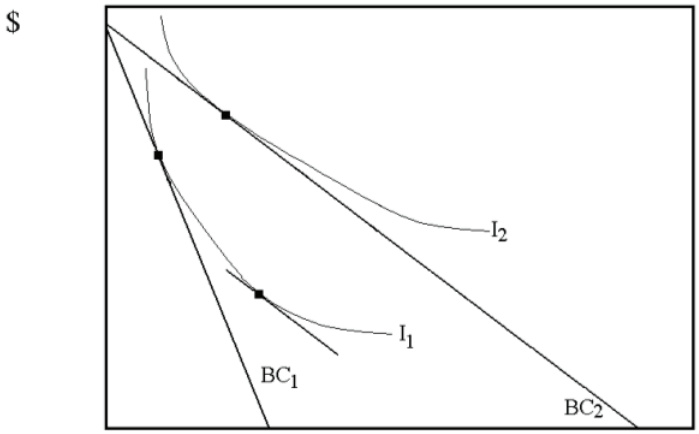


Answer:

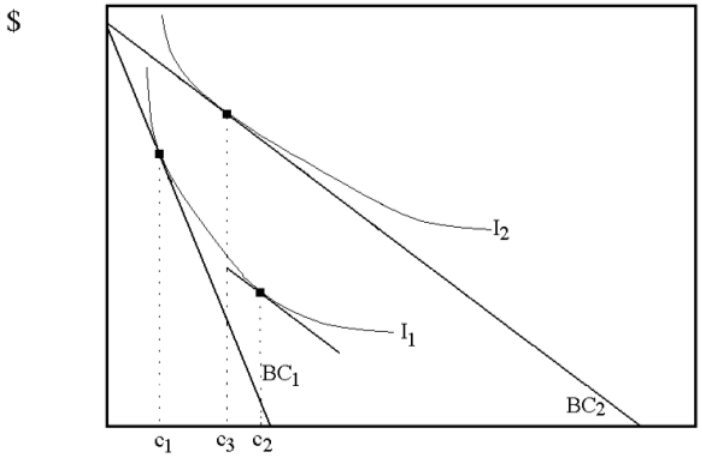


Diff: 2
Section: 4.2

142) Margaret's optimal consumption is shown in the diagram below for two different prices of Hy–Vee Cola. Decompose the change in Hy–Vee Cola consumption into income and substitution effects. Do the effects work in opposite directions?



Answer:



The substitution effect is ($c_2 - c_1$). The income effect is ($c_3 - c_2$). Note that the income effect is negative. Thus, the income and substitution effects work in opposite directions.

Diff: 2
Section: 4.2

143) The demand curves for steak, eggs, and hot dogs are given in the table below. The current price of steak is \$5. The price of eggs is \$2.50, and the price of hot dogs is \$0.75. Fill in the remaining columns of the table using this information. Indicate which goods are substitutes and which goods are complements.

Good	Demand Equation	Steak Price Elasticity of Demand	Egg Price Elasticity of Demand	Hotdog Price Elasticity of Demand
Steak	$D_S = 500 - 2P_S - \frac{1}{10}P_E + P_H$			
Egg	$D_E = 75 - 3P_E - P_S + \frac{1}{10}P_H$			
Hotdog	$D_H = 300 - \frac{1}{2}P_H + P_S + \frac{1}{10}P_E$			

Answer:

Good	Demand Equation	Steak Price Elasticity of Demand	Egg Price Elasticity of Demand	Hotdog Price Elasticity of Demand
Steak	$D_S = 500 - 2P_S - \frac{1}{10}P_E + P_H$	–0.020	–0.00051	1.53
Egg	$D_E = 75 - 3P_E - P_S + \frac{1}{10}P_H$	–0.079	–0.24	1.20E – 4
Hotdog	$D_H = 300 - \frac{1}{2}P_H + P_S + \frac{1}{10}P_E$	0.016	0.00082	–0.0012

Steak and eggs are complements. Steak and hotdogs and eggs and hotdogs are substitutes.

Diff: 3
Section: 4.2

144) Joe's Pig Palace sells barbecue plates for $4.50 each, and serves an average of 525 customers per week. During a recent promotion, Joe cut his price to $3.50 and observed an increase in sales to 600 plates per week.

a. Calculate Joe's arc price elasticity of demand.
b. Joe is considering permanently lowering his price to $4.00 to increase revenue. How many plates should Joe expect to sell at the new price? Does the move make sense in the light of Joe's desire to increase revenue?

Answer: *a.*

$$E = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1 + P_2}{Q_1 + Q_2}$$

$$E = \frac{600 - 525}{3.50 - 4.50} \cdot \frac{4.50 + 3.50}{525 + 600}$$

$$E = \frac{75}{-1} \cdot \frac{8.00}{1125}$$

$$E = \frac{8}{-15} = -0.533$$

b.

Since 4.00 is within this arc, –0.533 can be regarded as the relevant elasticity. We will use $4.50 and 525 as the beginning price and quantity

$$-0.533 = \frac{Q_2 - 525}{4.00 - 4.50} \cdot \frac{4.50 + 4.00}{525 + Q_2}$$

$$-0.533 = \frac{Q_2 - 525}{-0.50} \cdot \frac{8.50}{525 + Q_2}$$

$$-0.533 = \left[Q_2 - 525\right] = \frac{-17}{525 + Q_2}$$

$$-0.533 = \left[Q_2 + 525\right] = -17Q_2 + 8925$$

$$-279.83 - 0.533Q_2 = -17Q_2 + 8925$$

$$16.47Q_2 = 9204.83$$

$$Q_2 = 558.88$$

Joe's move doesn't make sense since demand is inelastic. With inelastic demand, price and total expenditures move in the same direction. As he lowers price, total expenditures will also fall.

To verify:
Before Cut total expenditures = $4.50 × 525 = $2,362.50
After Cut total expenditures = $4.00 × 559 = $2,236.00

Diff: 2
Section: 4.3

145) Harding Enterprises has developed a new product called the Gillooly shillelagh. The market demand for this product is given as follows:

$$Q = 240 - 4P$$

a. If the shillelagh is priced at $40, what is the point price elasticity of demand? Is demand elastic or inelastic?
b. If the shillelagh price is increased slightly from $40, what will happen to the total expenditure on the Gillooly shillelagh?

Answer: ***a.***

The price elasticity of demand equals $(P/Q)(\Delta Q/\Delta P)$. If P equals $40, Q equals 80. $(\Delta Q/\Delta P)$ is constant along a linear demand curve. In this case it equals −4. Therefore, the price elasticity of demand equals $(40/80)(-4) = -2$ and demand is elastic.

b.

An increase in the price of a good with elastic demand will result in a decrease in the total expenditure on the good.

Diff: 2
Section: 4.3

146) Answer both parts of the following question.

a. The San Francisco Chronicle reported that the toll on the Golden Gate Bridge was raised from $2 to $3. Following the toll increase, traffic fell by 5 percent. Based on this information, calculate the point price elasticity of demand. Is demand elastic or inelastic? Explain.
b. Stephen Leonoudakis, chairman of the bridge's finance auditing committee, warned that the toll increase could cause toll revenues to decrease by $2.8 million per year. Is this statement consistent with economic theory? Explain.

Answer: ***a.***

Increasing the toll on the bridge form $2 to $3 is a 50 percent increase. Traffic is expected to decrease by 5 percent as a result of the toll increase. Therefore, the point price elasticity of demand is −5/50 or −0.1. Demand is inelastic.

b.

Stephen Leonoudakis' statement is not consistent with economic theory. When demand is inelastic, an increase in price will increase total expenditures on a good (the total expenditure on the good is the total revenue of the firm). Since demand is inelastic here, toll revenues will increase rather than decrease.

Diff: 3
Section: 4.3

147) The demand for telephone wire can be expressed as:

$$Q = 6000 - 1{,}500P,$$

where Q represents units, in pounds per day, and P represents price, in dollars per pound. Determine the price elasticity of demand at P = $2.00 per pound.

Answer: We use the point price elasticity concept. First, we calculate Q at P = $2.00.

$$Q = 6000 - 1{,}500(2) = 3{,}000 \text{ pounds per day.}$$

$$E_P = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = (-1500)\frac{2}{3000} = -1$$

This indicates a unitary elasticity at this price.

Diff: 2
Section: 4.3

148) Sally Henin has a price elasticity of demand for gasoline of –0.8. Her income elasticity for gasoline is 0.5. Sally's current income is $40,000 per year. Sally currently spends $800 per year on gasoline. The price of gasoline is currently $1.00 per gallon.

a. A contemplated excise tax on gasoline will cause the price of gasoline to rise to $1.40. What impact will the tax have on Sally's consumption of gasoline?
b. Since the purpose of the tax is only to discourage gasoline consumption, Congress is considering a $200 income tax rebate to lessen the burden of the gasoline tax. What impact will the rebates have on Sally's consumption of gasoline?
c. Assume that both the tax and rebate are implemented. Will Sally be worse off or better off?

Answer: *a*.

Arc price formula is $E = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1 + P_2}{Q_1 + Q_2}$

$$-0.80 = \frac{Q_2 - 800}{1.40 - 1.00} \cdot \frac{1.00 + 1.40}{Q_2 + 800}$$

$$-0.80 = \frac{Q_2 - 800}{0.40} \cdot \frac{2.40}{Q_2 + 800}$$

$$-0.80 = \left[Q_2 + 800\right] = \left[Q_2 - 800\right]6$$

$$-0.80Q_2 - 640 = 6Q_2 - 4800$$

$$6.80Q_2 = 4160$$

$$Q_2 = 611.79 \text{ or } 612 \text{ gallons}$$

Her consumption will fall to 612 gallons.

At a price of $1.40 per gallon, she will spend $856.80 for gasoline.

b.

For part b use 612 as Q_1. Arc income formula is:

$$E_Y = \frac{Q_2 - Q_1}{Y_2 - Y_1} \cdot \frac{Y_1 + Y_2}{Q_1 + Q_2}$$

$$0.50 = \frac{Q_2 - 612}{40{,}200 - 40{,}000} \cdot \frac{40{,}000 + 40{,}200}{Q_2 + 612}$$

$$0.50 = \frac{Q_2 - 612}{200} \cdot \frac{80{,}200}{Q_2 + 612}$$

$$0.50\left[Q_2 + 612\right] = \left[Q_2 - 612\right]401$$

$$0.50Q_2 + 306 = 401Q_2 - 245{,}412$$

$$Q_2 = 613.53$$

The tax rebate will have very little impact on Sally's consumption of gasoline.

c.

On the final indifference curve, she spends 614 × $1.40 on gasoline.

614 × $1.40 = $859.60

With an income of 40,200 (after the rebate), she has $40,200 – $859.60 = $34,340.40 left to spend on other goods.

Before the tax and rebate, she would have had $40,000 – $614, or $39,386 left for other goods. She could have chosen her current amount of gasoline and had more of the other goods. Therefore she was better off before the tax and rebate.

Diff: 3
Section: 4.3

149) The world demand for power transmission wire is made up of both domestic and foreign demands. Thus, the total demand is the sum of the two sub–demands, which are given as:

Domestic demand: Pd = 5 – 0.005Qd

Foreign demand: Pf = 3 – 0.00075Qf,

where Pd and Pf are in dollars per pound, and Qd and Qf are in pounds per day.

a. Determine the world demand for power transmission wire.
b. Determine the prices at which domestic and foreign buyers would enter the market.
c. Determine the domestic and foreign quantities at P = $2.50 per pound. Check to see if the sum of Qd and Qf equals Q.
d. Determine total rate of purchases at P = $4.00 per pound.

Answer: ***a.***

To calculate world demand, the two demands must be added together. We must express the sum of quantities demanded in terms of price. Thus, Q = Qd + Qf.

Each expression must be solved in terms of quantity.

$$\text{Domestic: } Q_d - \frac{5 - P_d}{0.005} = 1{,}000 - 200P_d$$

$$\text{Foreign: } Q_f - \frac{3 - P_f}{0.00075} = 4{,}000 - 1{,}333.33P_f$$

$$Q = 5{,}000 - 1{,}533.33P_f \quad \begin{cases} 0 \le P_d \le 5 \\ 0 \le P_f \le 3 \end{cases}$$

b.

Domestic buyers enter the market at $P_d \le 5$.

Foreign buyers enter the market at $P_f \le 3$.

c.

At P = $2.50 per pound:

Qd = 1,000 – 200(2.5) = 500.00 pounds per day.

Qf = 4,000 – 1,333.33(2.5) = 666.68 pounds per day.

Q = 5,000 – 1,533.33(2.5) = 1,166.68 pounds per day.

Check: Qd + Qf = Q

500 + 666.08 = 1,166.68

d.

At P = $4.00 per pound, only domestic buyers enter the market; therefore, the world demand equation is not the appropriate equation to use in this case. We must use only the domestic demand equation.

Qd = 1000 – 200(4) = 200 pounds per day

Diff: 3
Section: 4.3

150) Suppose that the demand for artichokes (Qa) is given as:

Qa = 120 – 4P

a. What is the point price elasticity of demand if the price of artichokes is $10?

b. Suppose that the price of artichokes increases to $12. What will happen to the number of artichokes sold and the total expenditure by consumers on artichokes?

c. At what price if any is the demand for artichokes infinitely elastic?

Answer: ***a.***

The inverse of the slope of the demand curve, $\frac{\Delta Q_a}{\Delta P}$ is –4, P = 10,

Q = 80.

Therefore, the point price elasticity of demand is:

EP = (–4)(10)(80) = –.5

b.

The demand is inelastic. Thus, if the price of artichokes increases to $12, the total expenditure (TE = P^*Q) on artichokes will increase from P^*Q = (10)(80) = $800 to P^*Q = (12)(72) = $864, even though the total number of artichokes sold has fallen.

c.

Demand is infinitely elastic at the price where the demand curve intersects the vertical axis. This occurs at P = $30.

Diff: 3
Section: 4.3

151) There are two types of people that live on planet Economus. The Utility function of each type is given in the table.

Type	Utility	MU_1	MU_2
I	$x_1^{2} x_2^{6}$	$2x_1 x_2^{6}$	$6x_1^{2} x_2^{5}$
II	$x_1^{6} x_2^{2}$	$6x_1^{5} x_2^{2}$	$2x_1^{6} x_2$

Derive the demand curves for each type. Everyone on the planet has \$1,000 of income per period and there are 100 individuals of type I and 100 individuals that are type II. Derive the market demand curve for each good.

Answer: To find a Type I individual's demand curve, we set $MRS_{1,2} = \frac{MU_1}{MU_2} = \frac{P_1}{P_2}$. We can then solve for optimal consumption of good 1 as a function of good 2. This is done as follows:

$\frac{x_2}{3x_1} = \frac{P_1}{P_2} \Rightarrow x_1 = \frac{P_2 x_2}{3P_1}$. We also know the individual will exhaust their income at the optimum consumption bundle. Thus, we may plug the above expression for good 1 into the budget constraint. This is done as follows:

$\$1{,}000 = P_1 x_1 + P_2 x_2 = P_1\left(\frac{P_2 x_2}{3P_1}\right) + P_2 x_2 = \frac{4}{3} P_2 x_2 \Rightarrow x_2 = \frac{\$750}{P_2}$. This allows us to re–express good 1 consumption as: $x_1 = \frac{\$250}{P_1}$. We apply the same procedure to Type II individual's to get the following demand curves: $x_1 = \frac{\$750}{P_1}$ and $x_2 = \frac{\$250}{P_2}$. To arrive at the market demand curve for good 1, we sum total demand by type I agents and total demand by type II agents. Doing so gives us market demand for good 1 as: $X_1 = 100\left(\frac{\$250}{P_1}\right) + 100\left(\frac{\$750}{P_1}\right) = \frac{\$100{,}000}{P_1}$. The same procedure should be used to determine market demand for good 2. Thus, $X_2 = 100\left(\frac{\$750}{P_2}\right) + 100\left(\frac{\$250}{P_2}\right) = \frac{\$100{,}000}{P_2}$.

Diff: 2
Section: 4.3

152) The table below lists the demand curve for sleeves of tennis balls for each member of the Parker family. Use this information to determine the Parker's aggregate family demand for tennis balls. What is the price elasticity of demand for each member of the family at \$2.00? What is the price elasticity of family aggregate demand at \$2.00?

Family Member	Demand	Elasticity
Joseph	$B = 100 - 2P$	
Mary	$B = 50 - 5P$	
Joe, Jr.	$B = 300$	
Paul	$B = 150 - \frac{P}{2}$	
David	$B = 0$	
FAMILY		

Answer:

Family Member	Demand	Elasticity
Joseph	$B = 100 - 2P$	$E = -2\left(\frac{2}{96}\right) = -0.042.$
Mary	$B = 50 - 5P$	$E = -5\left(\frac{2}{40}\right) = -0.25.$
Joe, Jr.	$B = 300$	$E = 0\left(\frac{2}{300}\right) = 0.$
Paul	$B = 150 - \frac{P}{2}$	$E = -\frac{1}{2}\left(\frac{2}{149}\right) = -0.007.$
David	$B = 0$	$E = 0\left(\frac{2}{0}\right).$
FAMILY	$B = 600 - 7.5P$	$E = -7.5\left(\frac{2}{585}\right) = -0.026$

Diff: 2
Section: 4.3

153) The demand curve for the daily edition of the Lubbock Avalanche Journal is $D = 85{,}000 - 30{,}000P$. The current price of the newspaper is \$0.50. Derive the Consumer Surplus for the newspaper.

Answer: At a price of \$0.50, the quantity demanded is 70,000. The vertical axis intercept of the demand curve is \$2.83 (choke price). Thus, Consumer Surplus is

$\frac{1}{2}(\$2.83 - \$0.50)70{,}000 = \$81{,}550.$

Diff: 1
Section: 4.4

154) Ronald's monthly demand for Cap Rock Chardonnay is given by $Q = 6 + \left(\frac{1}{5{,}000}\right)(I - T) - \frac{1}{10}P$, where I is Ronald's monthly income, T is his tax expense and P is the price of Cap Rock Chardonnay. Suppose the Price of Cap Rock Chardonnay is \$10, Ronald's monthly income is \$15,000, and his tax expense is \$5,000. Calculate how much Ronald changes his Chardonnay consumption if his taxes are increased by 20%. Also, calculate Ronald's Consumer Surplus from consuming Cap Rock Chardonnay before and after the increase in taxes.

Answer: Before the tax change, Ronald's optimal consumption of Cap Rock Chardonnay is $Q = 6 + \frac{1}{5{,}000}(15{,}000 - 5{,}000) - \frac{1}{10}(10) = 7$. The vertical axis intercept for Ronald's budget constraint is initially \$80. Thus, Ronald's Consumer Surplus before the increase in taxes is $\frac{1}{2}(\$80 - \$10)7 = \$245$. After the tax change, Ronald's optimal consumption of Cap Rock Chardonnay is $Q = 6 + \left(\frac{1}{5{,}000}\right)(15{,}000 - 6{,}000) - \frac{1}{10}(10) = 6.8$. The vertical axis intercept for Ronald's new budget constraint becomes \$78. Thus, Ronald's Consumer Surplus after the tax increase is $\frac{1}{2}(\$78 - \$10)6.8 = \$231.20$.

Diff: 2
Section: 4.4

155) Adriana is in charge of setting the price on basketball tickets for the local team's home games. From previous experience, she has estimated demand to be

$$P = 50 - 0.00166Q,$$

where P represents price in dollars per seat, and Q represents seats that could be sold per game. The seating capacity is 25,000 seats. Determine the number of tickets that would be sold at a ticket price of \$15 each. Also, determine the consumer surplus that could be absorbed from these consumers if Adriana were able to set ticket prices so that each customer (who values the ticket at least at \$15) pays the entirety of his or her actual valuation of the ticket.

Answer: At P = 15, the quantity sold is $\frac{50 - 15}{0.00166} = 21{,}084$ tickets.

The consumer surplus that could be absorbed is represented by the area under demand and above the price line at 15. Area = (1/2)b*h.

b = 21,084 – 0 = 21,084

h = 50 – 15 = 35

Consumer surplus = (.5)(21,084)(35) = \$368,970

Diff: 2
Section: 4.4

156) The wheat market is perfectly competitive, and the market supply and demand curves are given by the following equations:

QD = 20,000,000 – 4,000,000P

QS = 7,000,000 + 2,500,000P,

where QD and QS are quantity demanded and quantity supplied measured in bushels, and P = price per bushel.

a. Determine consumer surplus at the equilibrium price and quantity.

b. Assume that the government has imposed a price floor at $2.25 per bushel and agrees to buy any resulting excess supply. How many bushels of wheat will the government be forced to buy? Determine consumer surplus with the price floor.

Answer: ***a.***

The first step is to determine the equilibrium price $\left(P_e\right)$ and quantity $\left(Q_e\right)$ by equating QD and QS.

$$20{,}000{,}000 - 4{,}000{,}000P_e = 7{,}000{,}000 + 2{,}500{,}000P_e$$

$$13{,}000{,}000 = 6{,}500{,}000P_e$$

$$P_e = \$2.00.$$

Substitute into QD or QS

$$Q_e = 20{,}000{,}000 - 4{,}000{,}000(2)$$

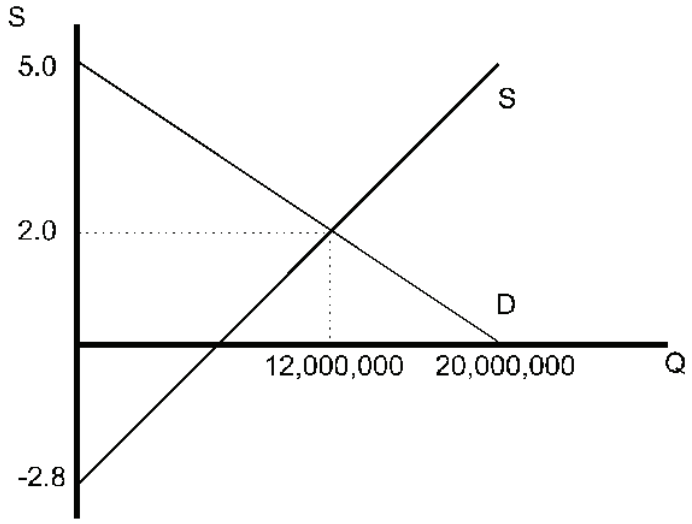
$$Q_e = 12{,}000{,}000.$$

To find consumer surplus, we must also determine the choke price $\left(P_c\right)$. That is, the price at which quantity demanded is zero. solve for P in terms of QD and QS.

$$0 = 20{,}000{,}000 - 4{,}000{,}000P_c$$

$$4{,}000{,}000P_c = 20{,}000{,}000$$

$$P_c = 5.$$



$$\text{CS} = \frac{1}{2}\left(P_c - P_e\right)Q_e = 0.5(5 - 2)12{,}000{,}000 = 18{,}000{,}000.$$

b.

At price of 2.25

$$\text{QD} = 20{,}000{,}000 - 4{,}000{,}000(2.25)$$

QD = 11,000,000

QS = 7,000,000 + 2,500,000(2.25)

QS = 12,625,000

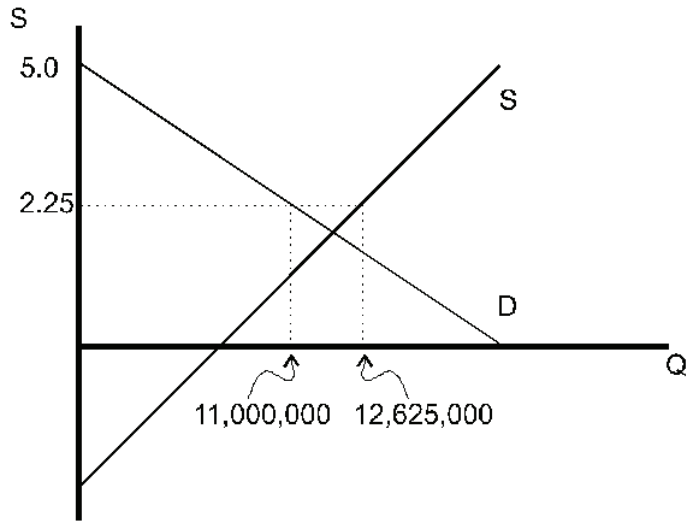
Excess supply is QS – QD.

12,625,000 – 11,000,000 = 1,625,000

Government should expect to buy 1,625,000 bushels.

Cs = (0.5)(Pc – $2.25)QD = (0.5)(5 – 2.25)(11,000,000) = 15,125,000.

C.S. fell from 18,000,000 to 15,125,000



Diff: 2
Section: 4.4

157) The market supply curve of rubber erasers is given by $Q_S = 35{,}000 + 2{,}000P$. The demand for rubber erasers can be segmented into two components. The first component is the demand for rubber erasers by art students. This demand is given by $q_A = 17{,}000 - 250P$. The second component is the demand for rubber erasers by all others. This demand is given by $q_O = 25{,}000 - 2000P$. Derive the total market demand curve for rubber erasers. Find the equilibrium market price and quantity. Also, determine the consumer surplus for each component of demand.

Answer: The aggregate market demand is given by summing the two components of demand at each price. That is, $Q_D = q_A + q_O = 42{,}000 - 2{,}250P$. The equilibrium quantity occurs where quantity demanded equals quantity supplied. Thus, we can equate supply and demand and solve for the market price. That is,

$Q_S = 35{,}000 + 2{,}000P = 42{,}000 - 2{,}250P = Q_D \Rightarrow P = \frac{7{,}000}{4{,}250} = \$1.65$. The equilibrium quantity is then $Q = 42{,}000 - 2{,}250(1.65) = 38{,}187.5$. At this price, $q_A = 17{,}000 - 250(1.65) = 16{,}587.5$ and $q_O = 25{,}000 - 2000(1.65) = 21{,}700$. The consumer surplus to the first component of demand is $CS_A = \frac{1}{2}(16{,}587.5)\$66.35 = \$550{,}290.30$.

The consumer surplus to the second component is

$CS_O = \frac{1}{2}(21{,}700)\$10.85 = \$117{,}722.50$.

Diff: 2
Section: 4.4

158) Laser disc players have been around for 10 years, but in the last several years, the sales have skyrocketed. Manufacturers attribute the increase in sales to lower prices, increased availability of movies on laser disk, and the appearance of laser disks for rent in video cassette rental stores. Describe this market using the concept of network externalities.

Answer: There is a strong positive network externality at work in the laser disk player market. Laser disk players can only play movies that are prerecorded on disks. As more movies become available, and as disk rental has become a reality, more people are buying the laser disk players.

The sales of laser disk players has also been aided by lower prices, but the effect of the lower prices is not a positive network externality.

Diff: 2
Section: 4.5

159) The demand for hamburgers is estimated from this theoretical model:

$Q = kP^aI^bA^ce$,

where Q = units per day, P = price per unit, A = advertising budget per month by sellers, I = per capita income of consumers, and e = a random error. In a recent study, one researcher estimated the log–linear form of this equation with regression analysis as:

$\log Q = 2.5 - 0.33\log P + 0.15\log I + 0.2\log A$.

Explain what the coefficients of log P, log I, and log A reveal about this product.

Answer: The coefficients of the variables are the respective elasticities of demand. The price elasticity is (–0.33), income elasticity is 0.15, and advertising elasticity is 0.2. These coefficients indicate that the product is relatively price inelastic, is a normal good, and is responsive to advertising outlays by sellers.

Diff: 2
Section: 4.6

160) The following table gives the current price, quantity, and price elasticities of the linear demand curves for pencils, paper and scissors. The columns $\boldsymbol{E_{rc}}$ under the Price Elasticities heading are calculated as $\boldsymbol{E_{rc}} = \left(\frac{\Delta Q_r}{\Delta P_c}\right)\frac{P_c}{Q_r}$. The terms *r* and *c* refer to the row of the table and the column under the price elasticities heading, respectively. For example, if *r* is one and *c* is two, the value $\boldsymbol{E}_{12}$ is the responsiveness of pencil demand to changes in the paper price (i.e., a cross–price elasticity). The demand curves for each good are in the form $Q_r = a_r + b_rP_1 + c_rP_2 + d_rP_3$. Using the information in the table, derive the demand curve for each good.

			Price Elasticities		
Demand Item	**Own Price**	**Quantity**	E_{r1}	E_{r2}	E_{r3}
Pencils	0.35	25,000	–1.2	0.25	0
Paper	2.00	90,000	0.01	–0.85	0.45
Scissors	3.15	1,500	0	1.20	–1.75

Answer: Using the information in the table allows us to solve for the coefficients on prices as follows:

$b_r = E_{r1}\left(\frac{Q_r}{P_1}\right)$; $c_r = E_{r2}\left(\frac{Q_r}{P_2}\right)$; and $d_r = E_{r3}\left(\frac{Q_r}{P_3}\right)$

Substituting these coefficient values into the demand equation allows us to solve for a_r. This is done by setting

$a_r = Q_r - \left(b_rP_1 + c_rP_2 + d_rP_3\right)$. Performing these calculations for the first row of the table gives us the demand for pencils $Q_1 = 48{,}750 - 85{,}714.3P_1 + 3{,}125P_2 + 0P_3$. The demand for paper is $Q_2 = 125{,}000 + 2{,}571.43P_1 - 38{,}250P_2 + 12{,}857.14P_3$. The demand for scissors is $Q_3 = 2{,}325 + 0P_1 + 900P_2 - 833.33P_3$.

Diff: 3
Section: 4.6

Chapter 5 Uncertainty and Consumer Behavior

Scenario 5.1:
Aline and Sarah decide to go into business together as economic consultants. Aline believes they have a 50–50 chance of earning $200,000 a year, and that if they don't, they'll earn $0. Sarah believes they have a 75% chance of earning $100,000 and a 25% chance of earning $10,000.

1) Refer to Scenario 5.1. The expected value of the undertaking,
   A) according to Sarah, is $75,000.
   B) according to Sarah, is $100,000.
   C) according to Sarah, is $110,000.
   D) according to Aline, is $200,000.
   E) according to Aline, is $100,000.

   Answer: E
   Diff: 1
   Section: 5.1

2) Refer to Scenario 5.1. The probabilities discussed in the information above are
   A) objective because they are single numbers rather than ranges.
   B) objective because they have been explicitly articulated by the individuals involved.
   C) objective because the event hasn't happened yet.
   D) subjective because the event hasn't happened yet.
   E) subjective because they are estimates made by individuals based upon personal judgment or experience.

   Answer: E
   Diff: 1
   Section: 5.1

Scenario 5.2:
Randy and Samantha are shopping for new cars (one each). Randy expects to pay $15,000 with 1/5 probability and $20,000 with 4/5 probability. Samantha expects to pay $12,000 with 1/4 probability and $20,000 with 3/4 probability.

3) Refer to Scenario 5.2. Which of the following is true?
   A) Randy has a higher expected expense than Samantha for the car.
   B) Randy has a lower expected expense than Samantha for the car.
   C) Randy and Samantha have the same expected expense for the car, and it is somewhat less than $20,000.
   D) Randy and Samantha have the same expected expense for the car: $20,000.
   E) It is not possible to calculate the expected expense for the car until the true probabilities are known.

   Answer: A
   Diff: 1
   Section: 5.1

4) Refer to Scenario 5.2. Randy's expected expense for his car is
A) $20,000. B) $19,000. C) $18,000. D) $17,500. E) $15,000.

Answer: B
Diff: 1
Section: 5.1

5) Refer to Scenario 5.2. Samantha's expected expense for her car is
A) $20,000. B) $19,000. C) $18,000. D) $17,500. E) $15,000.

Answer: C
Diff: 1
Section: 5.1

Consider the following information about job opportunities for new college graduates in Megalopolis:

Table 5.1

Major	Probability of Receiving an Offer in One Year	Average Salary Offer
Accounting	.95	$25,000
Economics	.90	$30,000
English	.70	$24,000
Poli Sci	.60	$18,000
Mathematics	1.00	$21,000

6) Refer to Table 5.1. Expected income for the first year is
A) highest in accounting.
B) highest in mathematics.
C) higher in English than in mathematics.
D) higher in political science than in economics.
E) highest in economics.

Answer: E
Diff: 1
Section: 5.1

7) Refer to Table 5.1. Ranked highest to lowest in expected income, the majors are
A) economics, accounting, English, mathematics, political science.
B) mathematics, English, political science, accounting, economics.
C) economics, accounting, mathematics, English, political science.
D) English, economics, mathematics, accounting, political science.
E) accounting, English, mathematics, political science, economics.

Answer: C
Diff: 1
Section: 5.1

Scenario 5.3:
Wanting to invest in the computer games industry, you select Whizbo, Yowzo and Zowiebo as the three best firms. Over the past 10 years, the three firms have had good years and bad years. The following table shows their performance:

Company	Good Year Revenue	Bad Year Revenue	Number of Good Years
Whizbo	$8 million	$6 million	8
Yowzo	$10 million	$4 million	4
Zowiebo	$30 million	$1 million	1

8) Refer to Scenario 5.3. Where is the highest expected revenue, based on the 10 years' past performance?
A) Whizbo
B) Yowzo
C) Zowiebo
D) Whizbo and Yowzo
E) Yowzo and Zowiebo

Answer: A
Diff: 1
Section: 5.1

9) Refer to Scenario 5.3. Based on the 10 years' past performance, what is the probability of a good year for Zowiebo?
A) 30/31 B) 1/31 C) 0.9 D) 0.1

Answer: D
Diff: 1
Section: 5.1

10) Refer to Scenario 5.3. Based on the 10 years' past performance, rank the companies' expected revenue, highest to lowest:
A) Whizbo, Yowzo, Zowiebo
B) Whizbo, Zowiebo, Yowzo
C) Zowiebo, Yowzo, Whizbo
D) Zowiebo, Whizbo, Yowzo
E) Zowiebo, with Whizbo and Yowzo tied for second

Answer: A
Diff: 1
Section: 5.1

11) Refer to Scenario 5.3. The expected revenue from all three companies combined is
A) $11 million
B) $17.9 million.
C) $25.5 million.
D) $29.5 million.
E) $48 million.

Answer: B
Diff: 1
Section: 5.1

The information in the table below describes choices for a new doctor. The outcomes represent different macroeconomic environments, which the individual cannot predict.

Table 5.3

	Outcome 1		Outcome 2	
Job Choice	**Prob.**	**Income**	**Prob.**	**Income**
Work for HMO	0.95	$100,000	0.05	$60,000
Own practice	0.2	$250,000	0.8	$30,000
Research	0.1	$500,000	0.9	$50,000

12) Refer to Table 5.3. The expected returns are highest for the physician who
A) works for an HMO.
B) opens her own practice.
C) does research.
D) either opens her own practice or does research.
E) either works for an HMO or does research.

Answer: A
Diff: 1
Section: 5.1

13) Refer to Table 5.3. Rank the doctor's job options in expected income order, highest first.
A) Work for HMO, open own practice, do research.
B) Work for HMO, do research, open own practice.
C) Do research, open own practice, work for HMO.
D) Do research, work for HMO, open own practice.
E) Open own practice, work for HMO, do research.

Answer: B
Diff: 1
Section: 5.1

14) In Table 5.3, the standard deviation is
A) highest for the HMO choice, and it is $76,000.
B) lowest for the HMO choice.
C) higher for owning one's own practice than for going into research.
D) higher for the HMO choice than for going into research.

Answer: B
Diff: 2
Section: 5.1

15) Refer to Table 5.3. In order to weigh which of the job choices is riskiest, an individual should look at
A) the deviation, which is the difference between the probabilities of the two outcomes.
B) the deviation, which is the difference between the dollar amounts of the two outcomes.
C) the average deviation, which is found by averaging the dollar amounts of the two outcomes.
D) the standard deviation, which is the square root of the average squared deviation.
E) the standard deviation, which is the squared average square root of the deviation.

Answer: D
Diff: 2
Section: 5.1

16) Refer to Table 5.3. Rank the doctor's job choices in order, least risky first.
A) Work for HMO, open own practice, do research
B) Work for HMO, do research, open own practice
C) Do research, open own practice, work for HMO
D) Do research, work for HMO, open own practice
E) Open own practice, work for HMO, do research

Answer: A
Diff: 2
Section: 5.1

17) Upon graduation, you are offered three jobs.

Company	Salary	Bonus	Probability of Receiving Bonus
Samsa Exterminators	100,000	20,000	.90
Gradgrind Tech	100,000	30,000	.70
Goblin Fruits	115,000	––––––––	–––––––

Rank the three job offers in terms of expected income, from the highest to the lowest.
A) Samsa Exterminators, Gradgrind Tech, Goblin Fruits
B) Samsa Exterminators, Goblin Fruits, Gradgrind Tech
C) Gradgrind Tech, Samsa Exterminators, Goblin Fruits
D) Gradgrind Tech, Goblin Fruits, Samsa Exterminators
E) Goblin Fruits, Samsa Exterminators, Gradgrind Tech

Answer: C
Diff: 1
Section: 5.1

18) As president and CEO of MegaWorld industries, you must decide on some very risky alternative investments:

Project	Profit if Successful	Probability of Success	Loss if Failure	Probability of Failure
A	$10 million	.5	–$6 million	.5
B	$50 million	.2	–$4 million	.8
C	$90 million	.1	–$10 million	.9
D	$20 million	.8	–$50 million	.2
E	$15 million	.4	$0	.6

The highest expected return belongs to investment
A) A. B) B. C) C. D) D.

Answer: B
Diff: 1
Section: 5.1

19) What is the advantage of the standard deviation over the average deviation?
A) Because the standard deviation requires squaring of deviations before further computation, positive and negative deviations do not cancel out.
B) Because the standard deviation does not require squaring of deviations, it is easy to tell whether deviations are positive or negative.
C) The standard deviation removes the units from the calculation, and delivers a pure number.
D) The standard deviation expresses the average deviation in percentage terms, so that different choices can be more easily compared.
E) The standard deviation transforms subjective probabilities into objective ones so that calculations can be performed.

Answer: A
Diff: 2
Section: 5.1

Table 5.4

Job	Outcome 1	Deviation	Outcome 2	Deviation
A	$40	W	$60	X
B	$20	Y	$50	Z

20) Refer to Table 5.4. If outcomes 1 and 2 are equally likely at Job A, then in absolute value
A) W = X = $10.
B) W = X = $20.
C) W = Y = $100.
D) W = Y = $200.
E) W = Y = $300.

Answer: A
Diff: 1
Section: 5.1

21) Refer to Table 5.4. If outcomes 1 and 2 are equally likely at Job A, then the standard deviation of payoffs at Job A is
A) $1. B) $10. C) $40. D) $50. E) $60.

Answer: B
Diff: 1
Section: 5.1

22) Refer to Table 5.4. If at Job B the $20 outcome occurs with probability .2, and the $50 outcome occurs with probability .8, then in absolute value
A) Y = Z = $6.
B) Y = Z = $24.
C) Y = Z = $35.
D) Y = $24; Z = $6.
E) Y = $6; Z = $24.

Answer: D
Diff: 1
Section: 5.1

23) Refer to Table 5.4. If at Job B the $20 outcome occurs with probability .2, and the $50 outcome occurs with probability .8, then the standard deviation of payoffs at Job B is nearest which value?

A) $10 B) $12 C) $20 D) $35 E) $44

Answer: B
Diff: 2
Section: 5.1

24) Refer to Table 5.4. If outcomes 1 and 2 are equally likely at Job A, and if at Job B the $20 outcome occurs with probability .1, and the $50 outcome occurs with probability .9, then

A) Job A is safer because the difference in the probabilities is lower.
B) Job A is riskier only because the expected value is lower.
C) Job A is riskier because the standard deviation is higher.
D) Job B is riskier because the difference in the probabilities is higher.
E) There is no definite way given this information to tell how risky the two jobs are.

Answer: C
Diff: 2
Section: 5.1

25) The expected value is a measure of

A) risk. B) variability.
C) uncertainty. D) central tendency.

Answer: D
Diff: 1
Section: 5.1

26) Assume that one of two possible outcomes will follow a decision. One outcome yields a $75 payoff and has a probability of 0.3; the other outcome has a $125 payoff and has a probability of 0.7. In this case the expected value is

A) $85. B) $60. C) $110. D) $35.

Answer: C
Diff: 1
Section: 5.1

27) The weighted average of all possible outcomes of a project, with the probabilities of the outcomes used as weights, is known as the

A) variance. B) standard deviation.
C) expected value. D) coefficient of variation.

Answer: C
Diff: 1
Section: 5.1

28) Which of the following is NOT a generally accepted measure of the riskiness of an investment?

A) Standard deviation B) Expected value
C) Variance D) none of the above

Answer: B
Diff: 1
Section: 5.1

29) The expected value of a project is always the
A) median value of the project.
B) modal value of the project.
C) standard deviation of the project.
D) weighted average of the outcomes, with probabilities of the outcomes used as weights.

Answer: D
Diff: 1
Section: 5.1

30) An investment opportunity has two possible outcomes, and the value of the investment opportunity is $250. One outcome yields a $100 payoff and has a probability of 0.25. What is the probability of the other outcome?
A) 0 B) 0.25 C) 0.5 D) 0.75 E) 1.0

Answer: D
Diff: 1
Section: 5.1

31) The variance of an investment opportunity:
A) cannot be negative.
B) has the same unit of measure as the variable from which it is derived.
C) is a measure of central tendency.
D) is unrelated to the standard deviation.

Answer: A
Diff: 2
Section: 5.1

32) An investment opportunity is a sure thing; it will pay off $100 regardless of which of the three possible outcomes comes to pass. The variance of this investment opportunity:
A) is 0.
B) is 1.
C) is 2.
D) is –1.
E) cannot be determined without knowing the probabilities of each of the outcomes.

Answer: A
Diff: 2
Section: 5.1

33) An investment opportunity has two possible outcomes. The expected value of the investment opportunity is $250. One outcome yields a $100 payoff and has a probability of 0.25. What is the payoff of the other outcome?
A) –$400
B) $0
C) $150
D) $300
E) none of the above

Answer: D
Diff: 2
Section: 5.1

Scenario 5.4:
Suppose an individual is considering an investment in which there are exactly three possible outcomes, whose probabilities and pay–offs are given below:

Outcome	Probability	Pay–offs
A	.3	$100
B	?	50
C	.2	?

The expected value of the investment is $25. Although all the information is correct, information is missing.

34) Refer to Scenario 5.4. What is the probability of outcome B?
A) 0 B) –0.5 C) 0.5 D) 0.4 E) 0.2

Answer: C
Diff: 2
Section: 5.1

35) Refer to Scenario 5.4. What is the pay–off of outcome C?
A) –150 B) 0 C) 25 D) 100 E) 150

Answer: A
Diff: 2
Section: 5.1

36) Refer to Scenario 5.4. What is the deviation of outcome A?
A) 30 B) 50 C) 75 D) 100

Answer: C
Diff: 2
Section: 5.1

37) Refer to Scenario 5.4. What is the variance of the investment?
A) –75 B) 275 C) 3,150 D) 4,637.50 E) 8,125

Answer: E
Diff: 2
Section: 5.1

38) Refer to Scenario 5.4. What is the standard deviation of the investment?
A) 0
B) 16.58
C) 56.12
D) 90.14
E) none of the above

Answer: D
Diff: 2
Section: 5.1

39) Blanca has her choice of either a certain income of $20,000 or a gamble with a 0.5 probability of $10,000 and a 0.5 probability of $30,000. The expected value of the gamble:
A) is less than $20,000.
B) is $20,000.
C) is greater than $20,000.
D) cannot be determined with the information provided.

Answer: B
Diff: 1
Section: 5.1

40) Use the following statements to answer this question:
I. Subjective probabilities are based on individual perceptions about the relative likelihood of an event.
II. To be useful in microeconomic analysis, all interested parties should agree on the values of the relevant subjective probabilities for a particular problem.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: B
Diff: 1
Section: 5.1

41) People often use probability statements to describe events that can only happen once. For example, a political consultant may offer their opinion about the probability that a particular candidate may win the next election. Probability statements like these are based on _____ probabilities.
A) frequency–based
B) objective
C) subjective
D) universally known

Answer: C
Diff: 1
Section: 5.1

42) Assume that two investment opportunities have identical expected values of $100,000. Investment A has a variance of 25,000, while investment B's variance is 10,000. We would expect most investors (who dislike risk) to prefer investment opportunity
A) A because it has less risk.
B) A because it provides higher potential earnings.
C) B because it has less risk.
D) B because of its higher potential earnings.

Answer: C
Diff: 1
Section: 5.2

Scenario 5.5:
Engineers at Jalopy Automotive have discovered a safety flaw in their new model car. It would cost $500 per car to fix the flaw, and 10,000 cars have been sold. The company works out the following possible scenarios for what might happen if the car is not fixed, and assigns probabilities to those events:

Scenario	Probability	Cost
A. No one discovers flaw	.15	$0
B. Government fines firm (no lawsuits)	.40	$10 million
C. Resulting lawsuits are lost (no government fine)	.30	$12 million
D. Resulting lawsuits are won (no government fine)	.15	$2 million

43) Refer to Scenario 5.5. The expected cost to the firm if it does not fix the car is
A) $0.
B) $24 million.
C) $7.9 million.
D) $2 million.
E) $3.6 million.

Answer: C
Diff: 1
Section: 5.2

44) Refer to Scenario 5.5. Which of the following statements is true?
A) The expected cost of not fixing the car is less than the cost of fixing it.
B) The expected cost of not fixing the car is greater than the cost of fixing it.
C) It is not possible to tell whether the expected cost of fixing the car is less than the cost of fixing it, because the probabilities are subjective.
D) It is not possible to tell whether the expected cost of fixing the car is less than the cost of fixing it, because the probabilities are not equal.

Answer: B
Diff: 2
Section: 5.2

45) Refer to Scenario 5.5. Jalopy Automotive's executives,
A) if risk–neutral, would fix the flaw because it enables them to have a sure outcome.
B) if risk–neutral, would fix the flaw because the cost of fixing the flaw is less than the expected cost of not fixing it.
C) if risk–loving, would fix the flaw because it enables them to have a sure outcome.
D) if risk–averse, would not fix the flaw because the cost of fixing the flaw is more than the expected cost of not fixing it.
E) would fix the flaw regardless of their risk preference, because of the large probability of high–cost outcomes.

Answer: B
Diff: 2
Section: 5.2

46) Other things equal, expected income can be used as a direct measure of well–being
A) always.
B) no matter what a person's preference to risk.
C) if and only if individuals are not risk–loving.
D) if and only if individuals are risk averse.
E) if and only if individuals are risk neutral.

Answer: E
Diff: 1
Section: 5.2

47) A person with a diminishing marginal utility of income
A) will be risk averse.
B) will be risk neutral.
C) will be risk loving.
D) cannot decide without more information

Answer: A
Diff: 1
Section: 5.2

48) An individual with a constant marginal utility of income will be
A) risk averse.
B) risk neutral.
C) risk loving.
D) insufficient information for a decision

Answer: B
Diff: 1
Section: 5.2

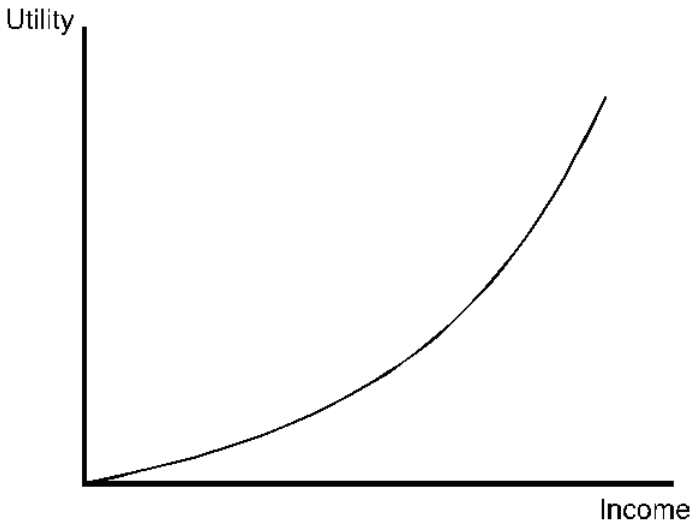


Figure 5.1

49) In Figure 5.1, the marginal utility of income is
A) increasing as income increases.
B) constant for all levels of income.
C) diminishes as income increases.
D) None of the above is necessarily correct.

Answer: A
Diff: 1
Section: 5.2

50) An individual whose attitude toward risk is illustrated in Figure 5.1 is
A) risk averse.
B) risk loving.
C) risk neutral.
D) None of the above is necessarily correct.

Answer: B
Diff: 1
Section: 5.2

51) The concept of a risk premium applies to a person that is
A) risk averse.
B) risk neutral.
C) risk loving.
D) all of the above

Answer: A
Diff: 1
Section: 5.2

52) John Brown's utility of income function is U = log(I+1), where I represents income. From this information you can say that
A) John Brown is risk neutral.
B) John Brown is risk loving.
C) John Brown is risk averse.
D) We need more information before we can determine John Brown's preference for risk.

Answer: C
Diff: 3
Section: 5.2

53) Amos Long's marginal utility of income function is given as: $MU(I) = I^{1.5}$, where I represents income. From this you would say that he is
A) risk averse.
B) risk loving.
C) risk neutral.
D) none of the above

Answer: B
Diff: 3
Section: 5.2

54) Blanca would prefer a certain income of $20,000 to a gamble with a 0.5 probability of $10,000 and a 0.5 probability of $30,000. Based on this information:
A) we can infer that Blanca neutral.
B) we can infer that Blanca is risk averse.
C) we can infer that Blanca is risk loving.
D) we cannot infer Blanca's risk preferences.

Answer: B
Diff: 1
Section: 5.2

55) The difference between the utility of expected income and expected utility from income is
A) zero because income generates utility.
B) positive because if utility from income is uncertain, it is worth less.
C) negative because if income is uncertain, it is worth less.
D) that expected utility from income is calculated by summing the utilities of possible incomes, weighted by their probability of occurring, and the utility of expected income is calculated by summing the possible incomes, weighted by their probability of occurring, and finding the utility of that figure.
E) that the utility of expected income is calculated by summing the utilities of possible incomes, weighted by their probability of occurring, and the expected utility of income is calculated by summing the possible incomes, weighted by their probability of occurring, and finding the utility of that figure.

Answer: D
Diff: 3
Section: 5.2

Scenario 5.6:
Consider the information in the table below, describing choices for a new doctor. The outcomes represent different macroeconomic environments, which the individual cannot predict.

	Outcome 1		Outcome 2	
Job Choice	**Prob.**	**Income**	**Prob.**	**Income**
Work for HMO	0.95	$100,000	0.05	$60,000
Own practice	0.2	$250,000	0.8	$30,000
Research	0.1	$500,000	0.9	$50,000

56) Refer to Scenario 5.6. The expected utility of income from research is
A) u($275,000).
B) u($95,000).
C) [u($500,000) + u($50,000)]/2.
D) .1 u($500,000) + .9 u($50,000).
E) dependent on which outcome actually occurs.

Answer: D
Diff: 1
Section: 5.2

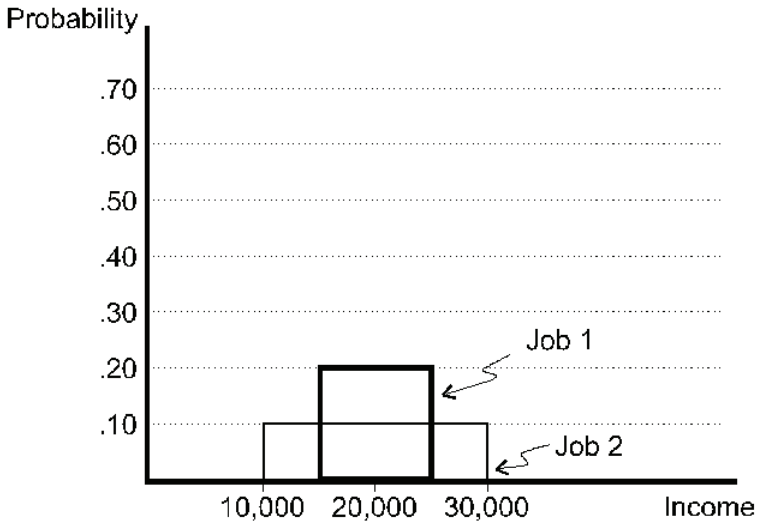
57) Refer to Scenario 5.6. The utility of expected income from research is
A) U($275,000).
B) U($95,000).
C) [U($500,000) + U($50,000)]/2.
D) .1U($500,000) + .9U($50,000).
E) dependent on which outcome actually occurs.

Answer: B
Diff: 2
Section: 5.2

58) Refer to Scenario 5.6. If the doctor is risk–averse, she would accept
A) $50,000 for sure rather than take the risk of being a researcher.
B) $60,000 for sure (the minimum HMO outcome) rather than take the risk of being a researcher.
C) $95,000 for sure rather than face option 1 and option 2 in research.
D) $275,000 for sure (the average of option 1 and option 2 in research), but not less, rather than face the risk of those two options.
E) the research position because it has the highest possible income.

Answer: C
Diff: 2
Section: 5.2

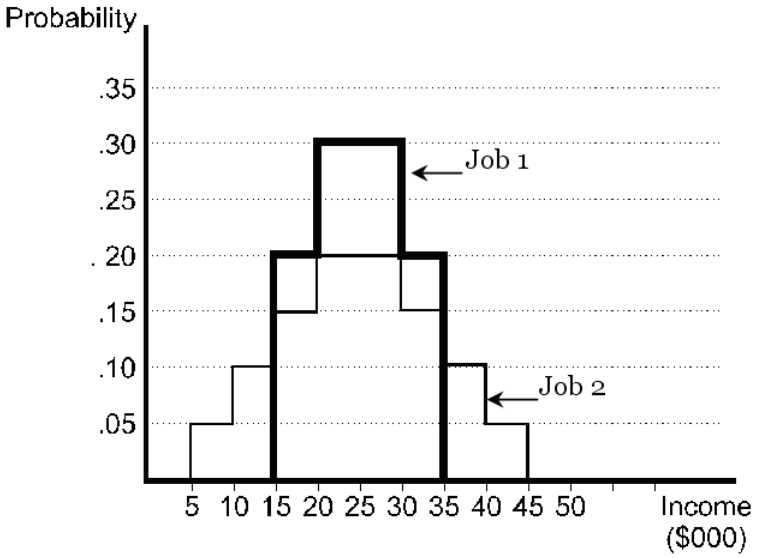
59) In the figure below, what is true about the two jobs?



A) Job 1 has a lower standard deviation than Job 2.
B) All outcomes in both jobs have the same probability of occurrence.
C) A risk–averse person would prefer Job 2.
D) A risk–neutral person would prefer Job 1.
E) Job 1 has a higher expected income than Job 2.

Answer: A
Diff: 2
Section: 5.2

60) In figure below, what is true about the two jobs?



A) Job 1 has a larger standard deviation than Job 2.
B) All outcomes in both jobs have the same probability of occurrence.
C) A risk–averse person would prefer Job 2.
D) A risk–neutral person would prefer Job 1.
E) Job 1 has the same expected income as Job 2.

Answer: E
Diff: 2
Section: 5.2

61) Upon graduation, you are offered three jobs.

Company	Salary	Bonus	Probability of Receiving Bonus
Samsa Exterminators	100,000	20,000	.90
Gradgrind Tech	100,000	30,000	.70
Goblin Fruits	115,000	––––––––	–––––––

Which of the following is true?
A) If you're risk–neutral, you go work for Goblin Fruits.
B) If you're risk–loving, you go work for Goblin Fruits.
C) If you're risk–neutral, you go work for Samsa Exterminators.
D) If you're risk–neutral, you go work for Gradgrind Tech.

Answer: D
Diff: 2
Section: 5.2

62) A risk–averse individual prefers
A) the utility of expected income of a risky gamble to the expected utility of income of the same risky gamble.
B) the expected utility of income of a risky gamble to the utility of expected income of the same risky gamble.
C) outcomes with 50–50 odds to those with more divergent probabilities, no matter what the dollar outcomes.
D) outcomes with higher probabilities assigned to more favorable outcomes, no matter what the outcomes are.
E) outcomes with highly divergent probabilities so that one of the outcomes is almost certain.

Answer: A
Diff: 2
Section: 5.2

63) A risk–averse individual has
A) an increasing marginal utility of income.
B) an increasing marginal utility of risk.
C) a diminishing marginal utility of income.
D) a diminishing marginal utility of risk.
E) a constant marginal utility of income, but a diminishing marginal utility of risk.

Answer: C
Diff: 1
Section: 5.2

64) Any risk–averse individual would always
A) take a 10% chance at $100 rather than a sure $10.
B) take a 50% chance at $4 and a 50% chance at $1 rather than a sure $1.
C) take a sure $10 rather than a 10% chance at $100.
D) take a sure $1 rather than a 50% chance at $4 and a 50% chance at losing $1.
E) do C or D above.

Answer: C
Diff: 3
Section: 5.2

65) What would best explain why a generally risk–averse person would bet $100 during a night of blackjack in Las Vegas?
A) Risk aversion relates to income choices only, not expenditure choices.
B) Risk averse people may gamble under some circumstances.
C) The economics of gambling and the economics of income risk are two different things.
D) Risk–averse people attach high subjective probabilities to favorable outcomes, even when objective probabilities are known.

Answer: B
Diff: 2
Section: 5.2

66) Dante has two possible routes to travel on a business trip. One is more direct but more exhausting, taking one day but with a probability of business success of 1/4. The second takes three days, but has a probability of success of 2/3. If the value of Dante's time is $1000/day, the value of the business success is $12,000, and Dante is risk neutral,
A) it doesn't matter which path he takes, because he doesn't consider risk.
B) he should take the 1–day trip, because he doesn't consider risk.
C) he should take the 1–day trip, because $11,000 is greater than $9,000.
D) he should take the 3–day trip, because it will increase his expected net revenue by $3,000.
E) he should take the 3–day trip, because it will increase his expected net revenue by $5,000.

Answer: D
Diff: 3
Section: 5.2

Scenario 5.7:
As president and CEO of MegaWorld industries, Natasha must decide on some very risky alternative investments. Consider the following:

Project	Profit if Successful	Probability of Success	Loss if Failure	Probability of Failure
A	$10 million	.5	–$6 million	.5
B	$50 million	.2	–$4 million	.8
C	$90 million	.1	–$10 million	.9
D	$20 million	.8	–$50 million	.2
E	$15 million	.4	$0	.6

67) Refer to Scenario 5.7. Since Natasha is a risk–neutral executive, she would choose
A) A. B) B. C) C. D) D. E) E.

Answer: B
Diff: 1
Section: 5.2

68) Refer to Scenario 5.7. As a risk–neutral executive, Natasha
A) is indifferent between projects D and E.
B) prefers project E to project D, but do not necessarily consider E the best.
C) prefers project E to all other projects.
D) seeks the highest "profit if successful" of all the projects.
E) seeks the project with the most even odds.

Answer: A
Diff: 1
Section: 5.2

Consider the following information about job opportunities for new college graduates in Megalopolis:

Table 5.1

Major	Probability of Receiving an Offer in One Year	Average Salary Offer
Accounting	.95	$25,000
Economics	.90	$30,000
English	.70	$24,000
Poli Sci	.60	$18,000
Mathematics	1.00	$21,000

69) Refer to Table 5.1. A risk–neutral individual making a decision solely on the basis of the above information would choose to major in
A) accounting.
B) economics.
C) English.
D) political science.
E) mathematics.

Answer: B
Diff: 1
Section: 5.2

70) Refer to Table 5.1. A risk–averse student making a decision solely on the basis of the above information
A) would definitely become a math major.
B) would definitely not become an English major.
C) would definitely become a political science major.
D) might be either a mathematics major or English major, depending upon the utility of the average offer.
E) would definitely be indifferent between the accounting major and the English major if the probability of finding a job in accounting were any value higher than 0.95.

Answer: D
Diff: 3
Section: 5.2

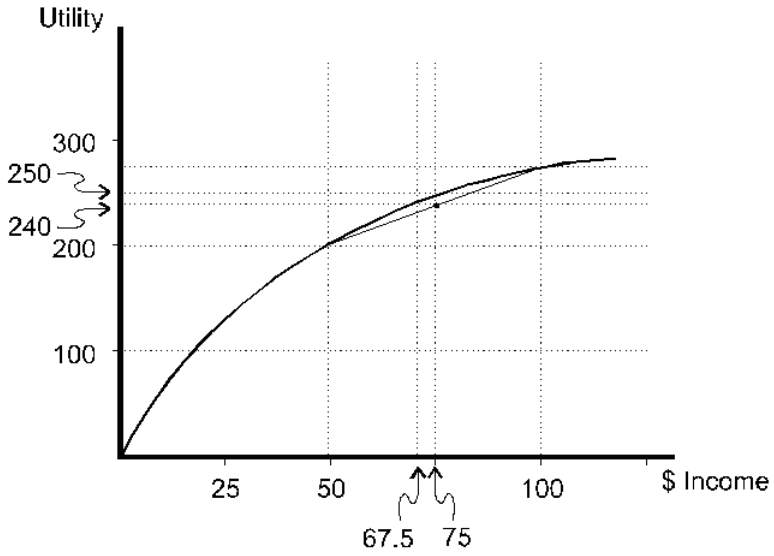


Figure 5.2

71) The individual pictured in Figure 5.2
A) must be risk–averse.
B) must be risk–neutral.
C) must be risk–loving.
D) could be risk–averse, risk–neutral, or risk–loving.
E) could be risk–averse or risk–loving, but not risk–neutral.

Answer: A
Diff: 1
Section: 5.2

72) The individual pictured in Figure 5.2
A) prefers a 50% chance of $100 and a 50% chance of $50 to a sure $75.
B) would receive a utility of 300 from a 50% chance of $100 and a 50% chance of $50.
C) would receive a utility of 300 from a sure $75.
D) would receive a utility of 250 from a sure $75.
E) is one for whom income is a measure of well–being.

Answer: D
Diff: 2
Section: 5.2

73) When facing a 50% chance of receiving $50 and a 50% chance of receiving $100, the individual pictured in Figure 5.2
A) would pay a risk premium of 10 utils to avoid facing the two outcomes.
B) would want to be paid a risk premium of 10 utils to give up the opportunity of facing the two outcomes.
C) would pay a risk premium of $7.50 to avoid facing the two outcomes.
D) would want to be paid a risk premium of $7.50 to avoid facing the two outcomes.
E) has a risk premium of 10 utils.

Answer: C
Diff: 3
Section: 5.2

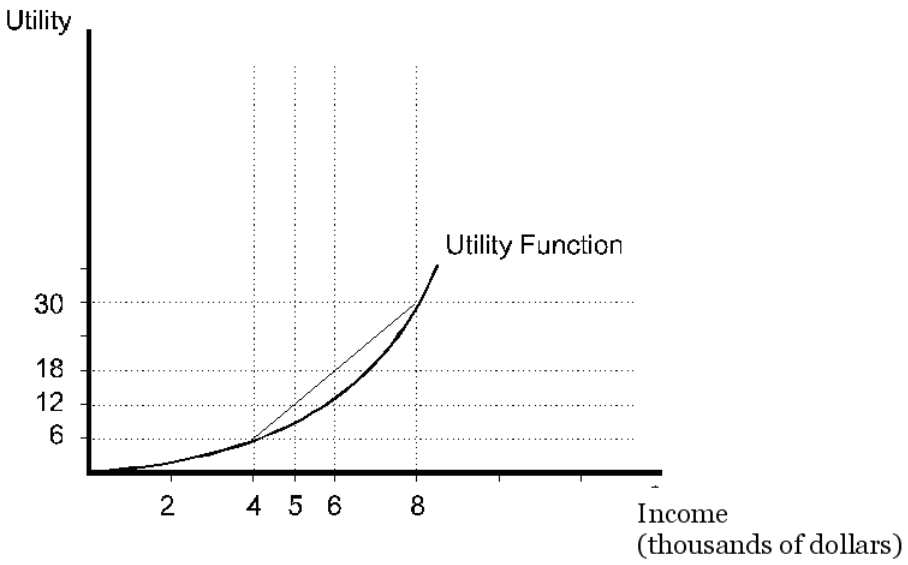


Figure 5.3

74) The individual pictured in Figure 5.3
A) must be risk–averse.
B) must be risk–neutral.
C) must be risk–loving.
D) could be risk–averse, risk–neutral, or risk–loving.
E) could be risk–averse or risk–loving, but not risk–neutral.

Answer: C
Diff: 1
Section: 5.2

75) The individual pictured in Figure 5.3
A) prefers a sure $6000 to a 50% chance of $4000 and a 50% chance of $8000.
B) has an expected utility of 12 from a 50% chance of $4000 and a 50% chance of $8000.
C) would receive a utility of 12 from a sure $6000.
D) would receive a utility of 18 from a sure $6000.

Answer: C
Diff: 2
Section: 5.2

76) The individual pictured in Figure 5.3
A) would pay a risk premium of 2 utils to avoid facing the two outcomes.
B) would want to be paid a risk premium of 2 utils to give up the opportunity of facing the two outcomes.
C) would pay a risk premium of $1000 to avoid facing the two outcomes.
D) would want to be paid a risk premium of $1000 to give up the opportunity of facing the two outcomes.
E) has a risk premium of 2 utils.

Answer: D
Diff: 2
Section: 5.2

77) A new toll road was built in Southern California between San Juan Capistrano and Costa Mesa. On average, drivers save 10 minutes taking this road as opposed to the old road. The toll is $2; the fine for not paying the toll is $76. The probability of catching and fining someone who does not pay the toll is 90%. Individuals who take the road and pay the toll must therefore value 10 minutes at a minimum

A) between $1.80 and $68.40.
B) between $2 and $68.40.
C) $1.80.
D) between $1.80 and $76.
E) more than $76.

Answer: B
Diff: 3
Section: 5.2

78) Consider the following statements when answering this question;

I. Without fire insurance, the expected value of homeownership for a risk averse homeowner is $W. Insurance companies are willing to sell this homeowner a policy that guarantees the homeowner a wealth of $W.

II. In a neighborhood where the price of houses are identical, the probability of a fire is identical, and the value of damage done by fires is identical, the risk premium for an insurance policy that repays all the cost of the fire damage does not vary across homeowners.

A) I and I are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: D
Diff: 3
Section: 5.2

79) A farmer lives on a flat plain next to a river. In addition to the farm, which is worth $F, the farmer owns financial assets worth $A. The river bursts its banks and floods the plain with probability P, destroying the farm. If the farmer is risk averse, then the willingness to pay for flood insurance unambiguously falls when

A) F is higher, and A is lower.
B) P is lower, and F is higher.
C) F & A are higher.
D) P is lower, and A is lower.
E) A is higher, and F is lower.

Answer: E
Diff: 3
Section: 5.2

80) Bill's utility function takes the form U(I) = exp(I) where I is Bill's income. Based on this utility function, we can see that Bill is:

A) risk averse
B) risk neutral
C) risk loving
D) He can exhibit two or more of these risk behaviors under this utility function.

Answer: C
Diff: 3
Section: 5.2

81) Consider two upward sloping income–utility curves with income on the horizontal axis. The steeper curve represents risk preferences that are more:
A) risk averse.
B) risk loving.
C) loss averting.
D) We cannot answer this question without more information about the shapes of the curves.

Answer: D
Diff: 1
Section: 5.2

82) The object of diversification is
A) to reduce risk and fluctuations in income.
B) to reduce risk, but not to reduce fluctuations in income.
C) to reduce fluctuations in income, but not to reduce risk.
D) neither to reduce risk, nor to reduce fluctuations in income.

Answer: A
Diff: 1
Section: 5.3

83) Which of these is NOT a generally accepted means of reducing risk?
A) Diversification
B) Insurance
C) Obtaining more information
D) none of the above

Answer: D
Diff: 1
Section: 5.3

84) The law of large numbers:
A) can be used to explain why some people are risk averse and others are risk neutral or risk loving.
B) can be used to explain why some people choose to self–insure against random, single and largely unpredictable events.
C) states that large amounts of information are often preferred to small amounts of information.
D) states that the average outcome of a large number of similar events can often be predicted.

Answer: D
Diff: 1
Section: 5.3

85) Smith just bought a house for $250,000. Earthquake insurance, which would pay $250,000 in the event of a major earthquake, is available for $25,000. Smith estimates that the probability of a major earthquake in the coming year is 10 percent, and that in the event of such a quake, the property would be worth nothing. The utility (U) that Smith gets from income (I) is given as follows:

$$U(I) = I^{0.5}.$$

Should Smith buy the insurance?

A) Yes.
B) No.
C) Smith is indifferent.
D) We need more information on Smith's attitude toward risk.

Answer: A
Diff: 2
Section: 5.3

86) Individuals who fully insure their house and belongings against fire

A) have wasted their money if a fire does not occur.
B) generally do so in order that their after–fire wealth can be equal to their before–fire wealth.
C) generally do so in order that their after–fire wealth can be higher than their before–fire wealth.
D) generally do so in order to guarantee that the worst outcome, a fire with no insurance, does not occur.
E) can never come out as well financially after a fire as they were before it.

Answer: D
Diff: 1
Section: 5.3

87) How might department stores best protect themselves against the risk of recession?

A) Buy insurance policies that pay off when a recession occurs.
B) Stand ready to go out of business if a recession occurs.
C) Sell goods that are complements to one another.
D) Sell both substitute and complement goods.
E) Sell both normal and inferior goods.

Answer: E
Diff: 2
Section: 5.3

88) In Eugene, Oregon, next year there is a 2% chance of an earthquake severe enough to destroy all buildings and personal property. Quincy, who has $3,000,000 in buildings and personal property, has the opportunity to purchase complete earthquake insurance. Which is true?
A) Quincy should not purchase earthquake insurance unless he can get it for less than $60,000, because that's all he could possibly lose in an earthquake.
B) Quincy should not purchase earthquake insurance unless he can get it for less than $60,000, because that's his expected loss in an earthquake.
C) If Quincy buys earthquake insurance, and an earthquake does not occur, he will have received no utility from the transaction.
D) What Quincy is willing to pay for the earthquake insurance depends upon his degree of risk aversion.
E) Quincy should be willing and able to pay up to $3,000,000 for earthquake insurance.

Answer: D
Diff: 2
Section: 5.3

89) One reason individuals are willing to pay for information in uncertain situations is that information
A) can reduce uncertainty.
B) is a way to diversify.
C) is a method of insurance.
D) is a method of self–insurance.
E) always reduces the difference between the probabilities of possible outcomes.

Answer: A
Diff: 1
Section: 5.3

Scenario 5.8:
Risk–neutral Icarus Airlines must commit now to leasing 1, 2, or 3 new airplanes. It knows with certainty that on the basis of business travel alone, it will need at least 1 airplane. The marketing division says that there is a 50% chance that tourism will be big enough for a second plane only. Otherwise, tourism will be big enough for a third plane. This, plus revenue information, yields the following table:

Planes	Tourism Revenue		Expected
Leased	Light	Heavy	Profit
2	$90 million	$30 million	$60 million
3	$10 million	$140 million	$75 million

90) Refer to Scenario 5.8. Without additional information, Icarus Airlines would
A) lease only the one airplane it is sure it can use.
B) lease 2 airplanes in order to guarantee it avoids the worst outcome, $10 million.
C) lease 3 airplanes because $140 million is greater than $90 million.
D) lease 3 airplanes because $75 million is greater than $60 million.
E) lease 3 airplanes because heavy tourism is more likely than light tourism.

Answer: D
Diff: 2
Section: 5.3

91) Refer to Scenario 5.8. Given that the two outcomes are equally likely, Icarus Airlines' expected profit under complete information would be
A) $40 million.
B) $90 million.
C) $115 million.
D) $120 million.
E) $125 million.

Answer: C
Diff: 2
Section: 5.3

92) Refer to Scenario 5.8. The value to Icarus Airlines of complete information is
A) $40 million.
B) $90 million.
C) $115 million.
D) $120 million.
E) $125 million.

Answer: A
Diff: 2
Section: 5.3

Scenario 5.9:
Torrid Texts, a risk–neutral new firm that specializes in making college textbooks more interesting by inserting contemporary material wherever possible, is planning for next year's production and must decide how many paper producers to contract with. It knows fairly well what the general demand for textbooks is, but is uncertain how faculty will react to this new material. If faculty react very negatively, the firm expects course orders to be down. The executives at Torrid believe that the likelihood of a positive faculty response is 75%. The table below contains profit information under the different possible outcomes.

Producers	Faculty Reaction		Expected
Contracted	Negative	Positive	Profit
1	$3 million	$30 million	$23.25 million
2	$1 million	$60 million	$45.25 million

93) Refer to Scenario 5.9. Without additional information, Torrid Texts would
A) contract with one paper producer in order to guarantee it avoids the worst outcome, $1 million.
B) contract with two paper producers because $60 million is greater than $30 million.
C) contract with two paper producers because $61 million is greater than $33 million.
D) contract with two paper producers because $45.25 million is greater than $23.25 million.
E) not be able to come to any decision on how many producers to contract with.

Answer: D
Diff: 2
Section: 5.3

94) Refer to Scenario 5.9. Given that the probability of a positive faculty response is 75%, Torrid Texts' expected profit under complete information would be
A) $23.25 million.
B) $45 million.
C) $45.25 million.
D) $45.75 million.
E) $60 million.

Answer: D
Diff: 2
Section: 5.3

95) Refer to Scenario 5.9. The value to Torrid Texts of complete information is
A) $0.25 million.
B) $0.5 million.
C) $1 million.
D) $14.75 million.
E) $30 million.

Answer: B
Diff: 2
Section: 5.3

96) Actual insurance premiums charged by insurance companies may exceed the actuarially fair rates because:
A) the insurance companies have monopoly rights issued by state regulators.
B) the insurance companies are risk averse.
C) there are administrative costs and other expenses that must be covered by the premia.
D) insurance companies tend to over–state the risks they face.

Answer: C
Diff: 1
Section: 5.3

97) We may not be able to fully remove risk by diversification if:
A) a completely risk–free asset does not exist.
B) the asset returns in our portfolio are positively correlated.
C) buying stock on margin is not allowed by financial regulators.
D) none of the above

Answer: B
Diff: 1
Section: 5.3

98) Suppose you cannot buy information that completely removes the uncertainty from a business decision that you face, but you could buy information that reduces the degree of uncertainty. Based on the discussion in this chapter, the value of this partial information could be determined as the:
A) expected outcome under complete certainty minus the expected outcome under the partial information case.
B) expected outcome under the partially uncertain case minus the expected outcome under the completely uncertain case.
C) utility of the partially certain case minus the utility of the completely certain case.
D) We cannot determine the value of information under partial certainty.

Answer: B
Diff: 1
Section: 5.3

99) The demand curve for a particular stock at any point in time is
A) very inelastic but not infinitely so.
B) almost infinitely inelastic.
C) infinitely elastic.
D) fairly elastic but not infinitely elastic.

Answer: C
Diff: 1
Section: 5.4

100) Which of the following assets is almost riskless?
A) Common stocks
B) Long–term corporate bonds
C) U.S. treasury bills
D) Long–term government bonds
E) Apartment buildings

Answer: C
Diff: 1
Section: 5.4

101) Which of the following statements is true?
A) The expected return and standard deviation of return are greater for common stock than for U.S. treasury bills.
B) The expected return on common stocks is greater than the expected return on U.S treasury bills, but the standard deviation of return for common stocks is less than the standard deviation of return for U.S. treasury bills
C) The expected return on common stocks is less than the expected return on U.S treasury bills, but the standard deviation of return for common stocks is greater than the standard deviation of return for U.S. treasury bills.
D) The expected return and standard deviation of return are less for common stocks than for U.S. treasury bills.

Answer: A
Diff: 2
Section: 5.4

Scenario 5.10:
Hillary can invest her family savings in two assets: riskless treasury bills or a risky vacation home real estate project on an Arkansas river. The expected return on treasury bills is 4 percent with a standard deviation of zero. The expected return on the real estate project is 30 percent with a standard deviation of 40 percent.

102) Refer to Scenario 5.10. If Hillary invests 30 percent of her savings in the real estate project and the remainder in treasury bills, the expected return on her portfolio is:
A) 4 percent.
B) 11.8 percent.
C) 17 percent.
D) 22.2 percent.
E) 30 percent.

Answer: B
Diff: 2
Section: 5.4

103) Refer to Scenario 5.10. If Hillary invests 30 percent of her savings in the real estate project and remainder in treasury bills, the standard deviation of her portfolio is:
A) 0 percent.
B) 12 percent.
C) 28 percent.
D) 30 percent.
E) 40 percent.

Answer: B
Diff: 2
Section: 5.4

104) Refer to Scenario 5.10. Hillary's indifference curves showing her preferences toward risk and return can be shown in a diagram. Expected return is plotted on the vertical axis and standard deviation of return on the horizontal axis. Although her indifference curves are upward sloping and bowed downward, their slope is very gradual (they are almost horizontal). These indifference curves reveal that Hillary is:
A) risk neutral. B) risk averse. C) risk loving. D) irrational.

Answer: B
Diff: 2
Section: 5.4

105) Refer to Scenario 5.10. Hillary's indifference curves showing her preferences toward risk and return can be shown in a diagram. Expected return is plotted on the vertical axis and standard deviation of return on the horizontal axis. Although her indifference curves are upward sloping and bowed downward, their slope is very gradual (they are almost horizontal). With these indifference curves Hillary will invest:
A) most of her savings in treasury bills, and a small percentage in the real estate project.
B) all of her savings in treasury bills.
C) half of her savings in treasury bills and half in the real estate project.
D) most of her savings in the real estate project, and a small percentage in treasury bills.

Answer: D
Diff: 3
Section: 5.4

106) Assume that an investor invests in one risky and one risk free asset. Let σ_m be the standard deviation of the risky asset and b the proportion of the portfolio invested in the risky asset. The standard deviation of the portfolio is then equal to _____.

A) $\frac{\sigma_m}{b}$ B) $\frac{(1 - \sigma_m)}{(1 - b)}$ C) $(1 - b)\,\sigma_m$ D) $b\sigma_m$

Answer: D
Diff: 2
Section: 5.4

107) The slope of the budget line that expresses the tradeoff between risk and return for an asset can be represented by

A) $(R_f - R_m)/\sigma_m$. B) $(R_m - R_f)/\sigma_m$.
C) $R_m - R_f$. D) b.

Answer: B
Diff: 2
Section: 5.4

108) Last year, on advice from your sister, you bought stock in Burpsy Soda at $100/share. During the year, you collected a $2 dividend and then sold the stock for $120/share. You experienced a

A) dividend yield of 9%.
B) dividend yield of 20%.
C) dividend yield of 11%.
D) total return of 20%.
E) total return of 22%.

Answer: E
Diff: 1
Section: 5.4

109) This year, on advice from your sister, you bought tobacco company stock at $50/share. During the year, you collected an $8 dividend, but due to the company's losses in medical lawsuits its stock fell to $40/share. At this point, you sell, realizing a

A) dividend yield of –16% and a capital loss of 20%.
B) dividend yield of 16% and a capital loss of 20%.
C) dividend loss 10%.
D) capital loss of 10%.
E) total loss of 20%.

Answer: B
Diff: 1
Section: 5.4

110) The correlation between an asset's real rate of return and its risk (as measured by its standard deviation) is usually

A) positive.
B) strictly linear.
C) flat.
D) negative.
E) chaotic.

Answer: A
Diff: 1
Section: 5.4

111) Because of the relationship between an asset's real rate of return and its risk, one would expect to find all of the following, except one. Which one?
A) Corporate stocks have higher rates of return than U.S. Treasury bonds.
B) Corporate stocks have higher rates of return than U.S. Treasury bills.
C) Corporate stocks have higher rates of return than corporate bonds.
D) Stocks of smaller companies have higher expected rates of return than stocks of larger companies.
E) Mutual funds including stocks of companies in politically volatile developing countries do not have as high a rate of return as mutual funds restricted to stocks of companies in developed economies.

Answer: E
Diff: 2
Section: 5.4

112) Nervous Norman holds 70% of his assets in cash, earning 0%, and 30% of his assets in an insured savings account, earning 2%. The expected return on his portfolio
A) is 0%.
B) is 0.6%
C) is 1%.
D) is 2%.
E) cannot be determined without knowing what the dollar value of his assets is.

Answer: B
Diff: 1
Section: 5.4

113) Daring Dora holds 90% of her assets in high-technology stocks, earning 12%, and 10% in long-term government bonds, earning 6%. The expected return on her portfolio
A) is 6%.
B) is 9%.
C) is 11.4%
D) is 12%.
E) cannot be determined without knowing what the dollar value of her assets is.

Answer: C
Diff: 1
Section: 5.4

114) The standard deviation of a two-asset portfolio (with a risky and a non-risky asset) is equal to
A) the fraction invested in the risky asset times the standard deviation of the non-risky asset.
B) the fraction invested in the non-risky asset times the standard deviation of the risky asset.
C) the fraction invested in the risky asset times the standard deviation of that asset.
D) the fraction invested in the non-risky asset times the standard deviation of that asset.

Answer: C
Diff: 2
Section: 5.4

115) The slope of the budget line, faced by an investor deciding what percentage of her portfolio to place in a risky asset, increases when the
A) standard deviation of the portfolio gets smaller.
B) standard deviation of the risky asset gets larger.
C) rate of return on the risk–free asset gets larger.
D) rate of return on the risky asset gets larger.
E) rate of return on money gets larger.

Answer: D
Diff: 2
Section: 5.4

116) The budget line in portfolio analysis shows that
A) the expected return on a portfolio increases as the standard deviation of that return increases.
B) the expected return on a portfolio increases as the standard deviation of that return decreases.
C) the expected return on a portfolio is constant.
D) the standard deviation of a portfolio is constant.
E) a riskless portfolio will earn a zero return.

Answer: A
Diff: 2
Section: 5.4

117) The indifference curve between expected return and the standard deviation of return for a risk–averse investor
A) is downward–sloping.
B) is upward–sloping.
C) is horizontal.
D) is vertical.
E) can take any shape.

Answer: B
Diff: 1
Section: 5.4

118) The indifference curves of two investors are plotted against a single budget line. Indifference curve A is shown as tangent to the budget line at a point to the left of indifference curve B's tangency to the same line.
A) Investors A and B are equally risk averse.
B) Investor A is more risk averse than investor B.
C) Investor A is less risk averse than investor B.
D) It is not possible to say anything about the risk aversion of the two investors, but they will hold the same portfolio.
E) It is not possible to say anything about either the risk aversion or the portfolio of the two investors.

Answer: B
Diff: 2
Section: 5.4

119) The indifference curves of two investors are plotted against a single budget line. Indifference curve A is shown as tangent to the budget line at a point to the left of indifference curve B's tangency to the same line.
A) Investors A and B will hold the same portfolio.
B) Investors A and B will have different portfolios of the same standard deviation.
C) Investors A and B will have different portfolios of the same rate of return.
D) Investors A and B will have different portfolios but have the same level of risk aversion.
E) Investor A will expect to earn a lower rate of return than investor B.

Answer: E
Diff: 2
Section: 5.4

120) Jack is near retirement and worried that if the stock market falls he will not be able to wait to take his funds out, and will have to sell at the bottom of the market. Richard thinks the probability of a stock market downturn is the same, but he is only 40 and could therefore wait for another turnaround. They face the same budget line. Jack's risk/return indifference curve
A) will be concave; Richard's will be convex.
B) will be convex; Richard's will be concave.
C) will be tangent to the budget line at a point to the left of Richard's.
D) will be tangent to the budget line at a point to the right of Richard's.
E) must still be tangent to the budget line at the same point as Richard's.

Answer: C
Diff: 2
Section: 5.4

121) Consider the following statements when answering this question;
I. The variance of the returns of an investor's portfolio can be reduced by selling assets from the portfolio, and investing the proceeds in other assets where returns are positively correlated with the portfolio's remaining assets.
II. The value of complete information is always positive.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: D
Diff: 3
Section: 5.4

122) Consider the following statements when answering this question;
I. The allocation of a risk averse investor's portfolio between a risk free asset and a risky asset never changes if the rate of return on both assets increases by the same amount.
II. Given the choice between investing in a risk free asset or a risky asset with higher expected returns, the utility maximizing portfolio of a risk neutral or risk loving investor would never include the risk free asset.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: B
Diff: 3
Section: 5.4

123) Is it possible for an investor to allocate more than 100% of their assets to the stock market?
A) No, this is not theoretically plausible.
B) No, federal law prohibits this kind of investment.
C) Yes, investors can borrow money to buy stocks on margin.
D) none of the above

Answer: C
Diff: 1
Section: 5.4

124) Suppose an investor equally allocates their wealth between a risk–free asset and a risky asset. If the MRS of the current allocation is less than the slope of the budget line, then the investor should:
A) shift more of their wealth to the risky asset.
B) shift more of their wealth to the risk–free asset.
C) keep the same asset allocation.
D) We do not have enough information to answer this question.

Answer: A
Diff: 1
Section: 5.4

125) Use the following statements to answer this question:
I. The real rate of return on an investment is the nominal return minus the rate of inflation.
II. The real rate of return on an investment cannot be negative.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: B
Diff: 1
Section: 5.4

126) Which of the following is NOT an example of consumer behavior consistent with the standard assumptions of microeconomic theory?
A) A concern for fairness can influence purchasing patterns.
B) When demand increases, all else being equal, consumers expect price to rise.
C) After a snowstorm, the demand for snow shovels increases.
D) Snow shovels and snow plows are substitute goods.
E) none of the above

Answer: A
Diff: 1
Section: 5.5

127) Which of the following is NOT an example of consumer behavior consistent with the standard assumptions of microeconomic theory?
A) People are less likely to leave tips at restaurants that they are unlikely to visit again.
B) Waiters and waitresses have an incentive to provide good service in order to earn tips.
C) Due to the convention of tipping, restaurants pay a lower wage to waiters and waitresses than they would in the absence of any tipping rule.
D) Although tipping reduces the amount of income available for purchasing goods, people usually leave tips at restaurants.
E) none of the above

Answer: D
Diff: 1
Section: 5.5

128) What is a reference point?
A) the value of a good on the black market
B) the point from which an individual makes a consumption decision
C) a subjective valuation of a good
D) the minimum price that an individual would sell a good that she currently owns
E) none of the above

Answer: B
Diff: 1
Section: 5.5

129) The tendency for individuals to assign higher values to goods when they own the goods than when they do not possess the goods is known as the:
A) substitution effect.
B) endowment effect.
C) income effect.
D) anchoring effect.

Answer: B
Diff: 1
Section: 5.5

130) Fine–dining restaurants commonly provide statements in their menus such as, "A 20% gratuity will be added to all checks for parties of six or more patrons." Given that this statement tends to raise the level of tips or gratuities left by other groups of diners, the statement is a good example of:
A) the endowment effect.
B) loss aversion.
C) anchoring.
D) none of the above

Answer: C
Diff: 2
Section: 5.5

131) Some high–end retail stores that distribute mail–order catalogs will prominently offer some very high priced goods for sale (for example, a luxury sports car with gold–plated interior trim) in addition to their regular line of merchandise. Behavioral economists argue that the stores do not really plan to sell these goods, but they use these items to provide the customers with a high reference point for the prices of the other goods in the catalog. This practice is an example of:

A) the ultimatim game.
B) loss aversion.
C) anchoring.
D) none of the above

Answer: C
Diff: 2
Section: 5.5

132) To demonstrate the anchoring phenomenon, Kahneman and Tversky would ask research subjects very difficult questions that should be answered with a number between zero and 100. Before asking for the respondent's answer, they would also spin a large wheel that generated random number outcomes from zero to 100. If the respondents were subject to the anchoring effect, then we should expect that:

A) their responses are uncorrelated with the numbers generated by the wheel.
B) their responses are correlated with the numbers generated by the wheel.
C) their responses are wrong most of the time.
D) none of the above

Answer: B
Diff: 2
Section: 5.5

133) Some recent developments in financial research focus on ways to make portfolio allocations and other investment decisions in ways that largely ignore the possible gains but protect against large losses. These tools are designed to reflect _____ behavior among investors.

A) risk neutral B) substitution C) loss aversion D) anchoring

Answer: C
Diff: 1
Section: 5.5

134) The law of small numbers describes:

A) the tendency for people to overstate the probability associated with rare events.
B) the ability to correctly estimate the expected outcome from a small number of events.
C) the higher probability that small numbers (like 1, 2, and 3) occur in random samples relative to large number (like 8 or 9).
D) the improved accuracy of averages to estimate relatively small numbers (on the order of 1 or 10) than relatively large numbers (on the order of 1,000 or 10,000).

Answer: A
Diff: 1
Section: 5.5

135) Behavioral economists argue that asset price bubbles and other examples of herd behavior may be due to biases resulting from the law of small numbers. In particular, the investors may observe unusually _____ returns for some asset and use this limited information to _____ the probability that returns will be high in the future.

A) low, over–estimate
B) low, under–estimate
C) high, over–estimate
D) high, under–estimate

Answer: C
Diff: 1
Section: 5.5

136) Standard game theory predicts a solution to the ultimatum game that is rarely observed when people actually play the game. The key reason that behavioral economists believe the predicted and observed outcomes differ is because people account for _____ of the outcome when making decisions.

A) loss aversion B) fairness C) efficiency D) utility

Answer: B
Diff: 1
Section: 5.5

137) Which of the following actions may be explained by the law of small numbers?

A) People buy lottery tickets.
B) People buy air travel insurance.
C) People purchase extended or long–term warranties or maintenance contracts for new automobiles and appliances.
D) all of the above

Answer: D
Diff: 1
Section: 5.5

138) Suppose your instructor gave hats with your school's logo to half of your economics classmates. She then asked these students to value the hats, and the average response was $9 per hat. Under the endowment effect, we should expect that the average value assigned by the economics students who did NOT receive the hats to be:

A) higher.
B) lower.
C) the same.
D) We cannot answer this question without knowing more about the risk preferences of the students.

Answer: B
Diff: 1
Section: 5.5

139) Tom Wilson is the operations manager for BiCorp, a real estate investment firm. Tom must decide if BiCorp is to invest in a strip mall in a northeast metropolitan area. If the shopping center is highly successful, after tax profits will be $100,000 per year. Moderate success would yield an annual profit of $50,000, while the project will lose $10,000 per year if it is unsuccessful. Past experience suggests that there is a 40% chance that the project will be highly successful, a 40% chance of moderate success, and a 20% probability that the project will be unsuccessful.

a. Calculate the expected value and standard deviation of profit.
b. The project requires an $800,000 investment. If BiCorp has an 8% opportunity cost on invested funds of similar riskiness, should the project be undertaken?

Answer: ***a.***

Expected Value

$$\bar{\pi} = \sum_{i=1}^{n} \hat{\pi}_i \, \hat{P}_i$$

$\hat{\pi}_i$	$\hat{P}_i$	$\hat{\pi}_i \hat{P}_i$
100,000	.4	40,000
50,000	.4	20,000
–10,000	.2	–2,000
		$\bar{\pi} = 58{,}000$

Standard deviation

$$\sigma = \sqrt{\sum_{i=1}^{n} \left[\pi_i - \bar{\pi}\right]^2 \hat{P}_i}$$

$\hat{\pi}_i$	$\left[\pi_i - \bar{\pi}\right]$	$\left[\pi_i - \bar{\pi}\right]^2$	$\left[\pi_i - \bar{\pi}\right]^2 P$
100,000	42,000	1,764,000,000	705,600,000
50,000	–8,000	64,000,000	25,600,000
–10,000	–68,000	4,624,000,000	924,800,000
			$\sigma^2 = 1{,}656{,}000{,}000$
			$\sigma = 40{,}693.98$

b.

Bio–Corp's opportunity cost is 8% of 800,000 or

$0.08 \times 800{,}000 = 64{,}000.$

The expected value of the project is less than the opportunity cost. Bi–Corp should not undertake the project.

Diff: 2
Section: 5.1

140) John Smith is considering the purchase of a used car that has a bank book value of $16,000. He believes that there is a 20% chance that the car's transmission is damaged. If the transmission is damaged, the car would be worth only $12,000 to Smith. What is the expected value of the car to Smith?

Answer: Expected Value = E($) = Pr($X_1$) + (1 – Pr)($X_2$),

where Pr is the probability of no transmission damage and Xi is the book value of the car without and with transmission damage, respectively.

E($) = .80(16,000) + .20(12,000)
= 12,800 + 2,400
= $15,200

Diff: 2
Section: 5.1

141) C and S Metal Company produces stainless steel pots and pans. C and S can pursue either of two distribution plans for the coming year. The firm can either produce pots and pans for sale under a discount store label or manufacture a higher quality line for specialty stores and expensive mail order catalogs. High initial setup costs along with C and S's limited capacity make it impossible for the firm to produce both lines. Profits under each plan depend upon the state of the economy. One of three conditions will prevail:

growth (probability = 0.3)
normal (probability = 0.5)
recession (probability = 0.2)

The outcome under each plan for each state of the economy is given in the table below. Figures in the table are profits measured in dollars. The probabilities for each economic condition represent crude estimates.

Economic Condition	Discount Line	Specialty Line
Growth	250,000	400,000
Normal	220,000	230,000
Recession	140,000	20,000

a. Calculate the expected value for each alternative.
b. Which alternative is more risky? (Calculate the standard deviation of profits for each alternative.)
c. Taking into account the importance of risk, which alternative should an investor choose?

Answer: ***a.***

Expected Value Discount Line
0.3(250,000) + 0.5(220,000) + 0.2(140,000)
EV = 213,000 (π = 213,000)

Expected Value Specialty Line
0.3(400,000) + 0.5(230,000) + 0.2(20.000)
EV = 239,000 (π = 239,000)

b.

σ^2 for discount line.

$\hat{\pi}_i$	$\left[\hat{\pi}_i - \overline{\pi}\right]$	$\left[\pi_i - \overline{\pi}\right]^2 P_i$
250,000	37,000	410,700,000
220,000	7,000	24,500,000
140,000	–73,000	1,065,800,000
		1,501,000,000

σ = 38,743

Expected Value Specialty Line:

$\hat{\pi}_i$	$\left[\hat{\pi}_i - \overline{\pi}\right]$	$\left[\pi_i - \overline{\pi}\right]^2 P_i$
400,000	161,000	7,776,300,000
230,000	–9,000	40,500,000
20,000	–219,000	9,592,200,000

$$\sigma^2 = 16{,}809{,}000{,}000$$
$$\sigma = 129{,}650$$

The discount store opportunity is far less risky.

c.
The specialty store offers a higher expected return but not in proportion to the increased risk (one could compute the coefficient of variation or observe this fact).

Diff: 3
Section: 5.1

142) Calculate the expected value of the following game. If you win the game, your wealth will increase by 36 times your wager. If you lose, you lose your wager amount. The probability of winning is $1/38$ Calculate the variance of the game.

Answer: The expected value (EV) of the game is calculated as

$EV = \frac{1}{38}(36w) + \frac{37}{38}(-w) = -\frac{w}{38}$. The variance of the game is calculated as

$$Var = \frac{1}{38}\left(36w - \frac{w}{38}\right)^2 + \left(\frac{37}{38}\right)\left(-w - \frac{w}{38}\right)^2 = \frac{1{,}294.11}{38}w^2 + 1.03w^2 = 35.09w^2.$$

Diff: 3
Section: 5.1

143) Calculate the expected value of the following game. If you win the game, your wealth will increase by 100,000,000 times your wager. If you lose, you lose your wager amount. The probability of winning is $\frac{1}{2{,}000{,}000}$.

Answer: The expected value of the game is calculated as

$$EV = \frac{1}{2{,}000{,}000}(100{,}000{,}000w) + \frac{1{,}999{,}999}{2{,}000{,}000}(-w) = \frac{98{,}000{,}001}{2{,}000{,}000}w \approx 49w.$$

Diff: 2
Section: 5.1

144) Farmer Brown grows wheat on his farm in Kansas, and the weather during the growing season makes this a risky venture. Over the many years that he has been in business, he has learned that rainfall patterns can be categorized as highly productive (HP) with a probability of .2, moderately productive (MP) with a probability of .6, and not productive at all (NP) with a probability of .2. With these various rainfall patterns, he has also learned that the inflation adjusted yields are $25,000 with NP weather, $10,000 with MP weather, and $50,000 with HP weather. Calculate the expected yield from growing wheat on Farmer Brown's farm. What can be learned about Brown's attitude toward risk from this problem? Explain.

Answer: $E(\text{Yield}) = (\text{HP})[P_{HP}] + (\text{MP})[P_{MP}] + (\text{NP})[P_{NP}]$

$= (50{,}000)[.2] + 10{,}000\,[.6] + (-25{,}000)[.2]$

$= 10{,}000 + 6{,}000 - 5{,}000$

$= \$11{,}000$

We don't have enough information to say anything about this person's attitude toward risk. We only know what can be expected from growing wheat in this location.

Diff: 2
Section: 5.2

145) Virginia Tyson is a widow whose primary income is provided by earnings received from her husband's $200,000 estate. The table below shows the relationship between income and total utility for Virginia.

Income	Total Utility
5,000	12
10,000	22
15,000	30
20,000	36
25,000	40
30,000	42

a. Construct the marginal utility table for Virginia. What is her attitude toward risk? Explain your answer including a description of the marginal utility for individuals whose risk preferences are different from Virginia's.
b. Virginia is currently earning 10% on her $200,000 in a riskless investment. Alternatively, she could invest in a project that has a 0.4 probability of yielding a $30,000 return on her investment and a 0.6 probability of paying $10,000. Should she alter her strategy and move her $200,000 to the more risky project?

Answer: ***a.***

Income	TU	MU
5,000	12	
10,000	22	10
15,000	30	8
20,000	36	6
25,000	40	4
30,000	42	2

Virginia is a risk averter as indicated by her declining marginal utility of income. A risk lover's marginal utility rises, while someone who is indifferent to risk has a constant marginal utility.

b.

She currently earns $20,000, receiving a total utility of 36. Her expected utility under the project would be:

Expected Utility = 0.4U(30,000) + 0.6U(10,000)
= 0.4(42) + 0.6(22)
Expected Utility = 30

Expected utility is less than current utility, so she should not change.

Diff: 2
Section: 5.2

146) The relationship between income and total utility for three investors (A, B, and C) is shown in the tables below.

A		B		C	
Income	TU	Income	TU	Income	TU
5,000	14	5,000	4	5,000	6
10,000	24	10,000	8	10,000	14
15,000	32	15,000	12	15,000	24
20,000	38	20,000	16	20,000	36
25,000	43	25,000	20	25,000	52
30,000	47	30,000	24	30,000	72
35,000	49	35,000	28	35,000	100

Each investor has been confronted with the following three investment opportunities. The first opportunity is an investment which pays $15,000 risk free. Opportunity two offers a 0.4 probability of a $25,000 payment and a 0.6 probability of paying $10,000. The final investment will either pay $35,000 with a probability of 0.25 or $5,000 with a probability of 0.75. Determine the alternative each of the above investors would choose. Provide an intuitive explanation for the differences in their choices.

Answer:

Investment 1	15,000	risk free.
Investment 2	25,000	0.4
	10,000	0.6
Investment 3	35,000	0.25
	5,000	0.75

Expected utility for person A

Investment 1

1. 15,000 risk free utility = 32

Investment 2

2. 25,000 0.4 utility = 43
   10,000 0.6 utility = 24
   0.4(43) + 0.6(24) = 31.6

Investment 3

3. 35,000 0.25 utility = 49
   5,000 0.75 utility = 14
   0.25(49) + 0.75(14) = 22.75

A would choose 15,000 risk free

Utility expected for person B

Investment 1

1. 15,000 risk free utility = 12

Investment 2

2. 25,000 0.4 utility = 20
   10,000 0.6 utility = 8
   0.4(20) + 0.6(8) = 12.8

Investment 3

3. 35,000 0.25 utility = 28
5,000 0.75 utility = 4
0.25(28) + 0.75(4) = 10

B would choose investment 2.

Utility expected for person C

Investment 1

1. 15,000 risk free utility = 24

Investment 2

2. 25,000 0.4 utility = 52
10,000 0.6 utility = 14
0.4(52) + 0.6(14) = 29.2

Investment 3

3. 35,000 0.25 utility = 100
5,000 0.75 utility = 6
0.25(100) + 0.75(6)= 29.5

Investor C would choose project 3.

Investment A is least risky, B is more risky, and C is most risky.
The risk averter in this case prefers no risk; A chooses project 1.
The risk neutral, B, pursues the mid–risk project 2.
The risk lover, C, prefers the gamble implied by project 3.

Diff: 2
Section: 5.2

147) Connie's utility depends upon her income. Her utility function is $U = I^{1/2}$. She has received a prize that depends on the roll of a pair of dice. If she rolls a 3, 4, 6 or 8, she will receive $400. Otherwise she will receive $100.

a. What is the expected payoff from this prize? [Hint: The probability of rolling a 3 is 1/18, the probability of rolling a 4 is 3/36, the probability of rolling a 6 is 5/36, and the probability of rolling an 8 is 5/36]
b. What is the expected utility from this prize?
c. Connie is offered an alternate prize of $169 (no dice roll is required). Will she accept the alternate prize or roll the dice?
d. What is the minimum payment that Connie will accept to forego the roll of the dice?

Answer: Expected return on stock:

a.

The probability of receiving $400 is 5/12. The probability of receiving $100 is 7/12.

Expected payoff = ($400)(5/12) + ($100)(7/12)
= $166.67 + $58.33
= $225

b.

The utility from $400 is $(400)^{1/2} = 20$ utils. The utility from $100 is $(100)^{1/2} = 10$ utils.

Expected utility = (20 utils)(5/12) + (10 utils)(7/12)
= 8.33 utils + 5.83 utils
= 14.16 utils

c.

The utility from $169 is $(169)^{1/2} = 13$ utils. The utility from rolling the dice (14.16 utils) is greater than the utility from a certain $169, therefore, Connie will turn down the $169 alternative prize and roll the dice.

d.

To convince Connie to accept a cash payment in lieu of rolling the dice the cash payment will have to provide more utility than rolling the dice. The expected utility from rolling the dice is 14.16 utils (see 1b). The cash payment that will yield 14.16 utils is calculated as follows:

$14.16 = I^{1/2}$
$14.16^2 = I$
$200.51 = I$

Connie is indifferent between a cash payment or $200.51 and a roll of the dice. A payment of $200.52 is preferred to the roll of the dice.

Diff: 3
Section: 5.2

148) Describe Larry, Judy and Carol's risk preferences. Their utility as a function of income is given as follows

Larry: $U_L(I) = 10\sqrt{I}$.
Judy: $U_J(I) = 3I^2$.
Carol: $U_C(I) = 20I$.

Answer: Larry's marginal utility of income is $\frac{5}{\sqrt{I}}$. As income increases, his marginal utility of income diminishes. This implies that Larry is risk–averse. Judy's marginal utility of income is $6I$. As income increases, her marginal utility of income increases. This implies that Judy is a risk–lover. Carol's marginal utility of income is 20. As income increases, her marginal utility of income is constant. This implies that Carol is risk–neutral.

Diff: 2
Section: 5.2

149) Steve has received a stock tip from Monica. Monica has told him that XYZ Corp. will increase in value by 100%. Steve believes that Monica has a 25% chance of being correct. If Monica is incorrect, Steve expects the value of XYZ Corp. will fall by 50%. What is Steve's expected utility from buying $1,000 worth of XYZ Corp. stock? Steve's utility of income is $U(I) = 50I$. Should Steve purchase the stock?

Answer: Steve's Expected utility from purchasing the stock is

$EV[U(I)] = \frac{1}{4}U(\$2{,}000) + \frac{3}{4}U(\$500) = \frac{1}{4}(100{,}000) + \frac{3}{4}(25{,}000) = 43{,}750$. Steve's utility from receiving $1,000 if he doesn't purchase the stock is 50,000. Steve should not purchase the stock, because his expected utility from holding the $1000 exceeds his expected utility from undertaking the transaction.

Diff: 2
Section: 5.2

150) George Steinbrenner, the owner of the New York Yankees, has a utility function of wins in a season given by $U(w) = \frac{1}{2}w^2$. Mr. Steinbrenner has been offered a trade. He believes if he completes the trade, his probability of winning 125 games is 15%. There is also an 85% chance the team won't gel and the Yankees will win only 90 games. Without the trade, Mr. Steinbrenner believes the Yankees will win 94 games. Given Mr. Steinbrenner's risk attitude, will he complete the trade?

Answer: Mr. Steinbrenner's expected utility from undergoing the trade is

$$\begin{aligned} EV[U(w)] &= 0.15U(125) + 0.85U(90) \\ &= 0.15(7{,}812.5) + 0.85(4{,}050) \\ &= 4{,}614.375. \end{aligned}$$

Mr. Steinbrenner's utility from foregoing the trade is $U(94) = \frac{94^2}{2} = 4{,}418$. Since the expected utility from the trade exceeds his utility with certainty, we would expect Mr. Steinbrenner to make the trade.

Diff: 2
Section: 5.2

151) Irene's utility of income function is $U(I) = 20I + 300$. Irene is offered the following game of chance. The odds of winning are $1/100$ and the pay–off is 75 times the wager. If she loses, she loses her wager amount. Calculate Irene's expected utility of the game.

Answer: Irene's Expected Utility of the game is:

$$EV[U(I)] = \frac{1}{100}(20\,(I + 75w) + 300) + \frac{99}{100}(20\,(I - w) + 300)$$

$$= 20I - 4.8w + 300.$$

Irene's expected utility loss of playing the game is 4.8 times her wager amount.

Diff: 2
Section: 5.2

152) Sam's utility of wealth function is $U(w) = 15\sqrt{w}$. Sam owns and operates a farm. He is concerned that a flood may wipe out his crops. If there is no flood, Sam's wealth is \$360,000. The probability of a flood is 1/15. If a flood does occur, Sam's wealth will fall to \$160,000. Calculate the risk premium Sam is willing to pay for flood insurance.

Answer: Sam's expected utility is $EV[U(w)] = \frac{1}{15}\left[15\sqrt{160{,}000}\right] + \frac{14}{15}\left[15\sqrt{360{,}000}\right]$.

$$= 400 + 8{,}400 = 8{,}800.$$

The level of wealth Sam needs with certainty to ensure this same level of utility is found by solving

$U(w_C) = 15\sqrt{w_C} = 8{,}800$ for w_C. This will be $w_C = \left(\frac{8{,}800}{15}\right)^2 = \$344{,}177.76$. Sam's risk premium is then the difference between his current wealth and w_C. This implies Sam is willing to pay \$15,822.24 for insurance against a flood.

Diff: 2
Section: 5.2

153) Richard is a stock market day trader. His utility of wealth function is $U(w) = 4\left(\frac{w}{1{,}000{,}000}\right)^2$.

Richard has seen a recent upward trend in the price of Yahoo stock. He feels that there is a 30% chance the stock will rise from \$175 per share to \$225. Otherwise, he believes the stock will settle to about \$150 per share. Richard's current wealth is \$1.75 million. Assume that if Richard purchases the stock, he will use his entire wealth. Given his risk preferences, will Richard buy Yahoo?

Answer: Richard will purchase the stock if his expected utility from owning the stock exceeds his current utility of wealth. His currently utility of wealth is:

$U(w = \$1{,}750{,}000) = 4(1.75)^2 = 12.25$.

Richard's expected utility from owning the stock is:

$$EV[U(w)] = 0.3\left[4(2.25)^2\right] + 0.7\left[4(1.5)^2\right]$$
$$= 0.3(20.25) + 0.7(9)$$
$$= 12.375.$$

Since Richard's expected utility of wealth from owning the stock exceeds his utility of wealth with certainty, Richard will buy the stock.

Diff: 2
Section: 5.2

154) Marsha owns a boat that is harbored on the east coast of the United States. Currently, there is a hurricane that is approaching her harbor. If the hurricane strikes her harbor, her wealth will be diminished by the value of her boat, as it will be destroyed. The value of her boat is $250,000. It would cost Marsha $15,000 to move the boat to a harbor out of the path of the hurricane. Marsha's utility of wealth function is $U(w) = \left(\frac{w}{1{,}000{,}000}\right)^2$. Marsha's current wealth is $3 million including the value of the boat. Past evidence has influenced Marsha to believe that the hurricane will likely miss her harbor, and so she plans not to move her boat. Suppose the probability the hurricane will strike Marsha's harbor is 0.7. Calculate Marsha's expected utility given that she will not move her boat. Calculate Marsha's expected utility if she moves her boat. Which of the two options gives Marsha the highest expected utility?

Answer: If she will not move her boat, Marsha's expected utility is

$EV[U(w)] = 0.7(2.75)^2 + 0.3(3)^2 = 7.99375$. If Marsha moves her boat, here expected utility is $U(w) = (3 - .015)^2 = 8.910225$. Marsha derives higher expected utility if she moves her boat.

Diff: 2
Section: 5.2

155) United Plastics Company produces large plastic cups in a variety of colors. United can produce plain plastic cups that are sold in department stores in inexpensive ten cup bundles. Alternatively, United can sell Novelty Cups which are imprinted with slogans and designs. The printed cups cost more to produce, but they sell for a higher price. The appropriate strategy for United depends upon the state of the economy. Plain cups do better during a recession, while Novelty Cups earn higher profits during normal economic conditions. During a recession, United will earn a $100,000 profit selling plain cups and $40,000 with the Novelty line. Under normal economic conditions, United will earn $120,000 with the plain cups and a $200,000 profit with Novelty Cups. United currently does not use economic forecasts and simply assigns equal probabilities to a recession and normal conditions.

a. Using the probabilities assumed by United, what is the expected value of each alternative? Which alternative should the firm pursue? (Your recommendation should include separate recommendations for alternative attitudes toward risk.)
b. Calculate and interpret the value to the firm of complete information.

Answer: a.

E.V. Plain Cups = 0.5(100,000) + 0.5(120,000)
= 110,000

E.V. Novelty Cups = 0.5(40,000) + 0.5(200,000)
= 120,000

If United were risk neutral, it would choose Novelty Cups. "A risk averter" would probably choose plain cups, ensuring at least a $100,000 profit. A risk lover would choose Novelty Cups, hoping to realize the $200,000 profit.

b.
With complete information, the firm would choose plain cups during recession and Novelty Cups during normal conditions. Expected value would be:

0.5(100,000) + 0.5(200,000) = 150,000

Value Complete Information:

Expected value under certainty	150,000
Expected value under uncertainty	120,000
Value Complete Information	30,000

Firm should pay up to $30,000 to obtain complete information.

Diff: 2
Section: 5.3

156) Mary is a fervent Iowa State University Cyclone Basketball fan. She derives utility as a function of the ISU team winning the Big XII championship and from income according to the function

$U(I_C, w) = 35I_C + w$, where $I_C = \begin{cases} 1 & Cyclone\ win \\ 0 & Cyclone\ loss \end{cases}$

and w is her level of wealth. Mary believes the probability of a Cyclone championship is $1/4$. Mary has been offered the following "insurance policy." The insurance policy costs \$16. If the Cyclones win the championship, she pays only the policy cost of \$16. If the Cyclones lose, she will receive \$21.50 (so that after taking into account the policy cost of \$16, her net return is \$5.50). Will Mary's expected utility increase if she purchases the policy?

Answer: If Mary does not purchase the policy, her expected utility will be: $E\left[U(I_C, w)\right] = \frac{1}{4}(35 + w) + \frac{3}{4}w = w + 8.75$. If Mary purchases the policy, her expected utility will be: $E\left[U(I_C, w)\right] = \frac{1}{4}(35 + w - 16) + \frac{3}{4}(w + 5.50) = w + 8.875$. Mary's expected utility with the policy is higher.

Diff: 2
Section: 5.3

157) Jonathan and Roberto enjoy playing poker. Jonathan's utility as a function of winning a poker hand is $U_J = \begin{cases} 100 & win \\ 25 & fold \\ 1 & lose \end{cases}$.

Roberto's utility as a function of winning a poker hand is $U_R = \begin{cases} 100 & win \\ 25 & fold \\ 1 & lose \end{cases}$.

Unfortunately for Jonathan, he has a habit of whistling only when he gets a full–house or better. Roberto, however, has not noticed this habit. Roberto currently has three–of–a–kind (which will lose to a full–house or better). Roberto believes that the probability Jonathan can beat his three–of–a–kind is $1/10$. Roberto could choose to fold or play the hand. Calculate Roberto's expected utility according to his beliefs. Jonathan is currently whistling. How much could Roberto increase his utility by recognizing Jonathan's whistling habit?

Answer: According to Roberto's beliefs, his expected utility from playing the hand is $U_R = \frac{1}{10}1 + \frac{9}{10}(100) = 90.1$. Since Roberto's expected utility from not folding exceeds his utility from folding, we will expect Roberto to play. However, if he plays, we know Roberto's actual utility will be 1 because Jonathan is whistling. If Roberto would recognize Jonathan's whistling habit in this instance, he would fold and raise his utility by 24 units.

Diff: 3
Section: 5.3

158) Sandra lives in the Pacific Northwest and enjoys walking to and from work during sunny days. Her utility is sharply diminished if she must walk while it is raining. Sandra's utility function is $U = 1{,}000I_1 + 250I_2 + 1I_3$ where $I_1 = 1$ if she walks and there is no rain and $I_1 = 0$ otherwise, $I_2 = 1$ if she drives to work and $I_2 = 0$ otherwise, and $I_3 = 1$ if she walks and it rains and $I_3 = 0$ otherwise. Sandra believes that the probability of rain today is $3/10$. Given her beliefs, what is her expected utility from walking to work? What is her expected utility from driving to work according to her beliefs? If Sandra maximizes her expected utility according to her beliefs, will she drive or walk to work? Sandra missed the weather report this morning that stated the true probability of rain today is $4/5$. Given the weather report is accurate, what is Sandra's true expected utility from walking and driving to work? How much could Sandra increase her expected utility if she read and believed the weather report?

Answer: Sandra's expected utility from walking according to her belief is $EV[U] = \frac{3}{10}(1) + \frac{7}{10}(1{,}000) = 700.3$. Also, according to Sandra's belief, her expected utility from driving is 250. If Sandra acts on her beliefs, we would expect her to walk to work today. If the weather report is accurate, her expected utility from walking to work is $EV[U] = \frac{4}{5}(1) + \frac{1}{5}(1{,}000) = 200.8$. Her expected utility from driving is still 250.

However, given these probabilities, Sandra would rather drive. Sandra would increase her expected utility 450.3 units by reading the weather report.

Diff: 2
Section: 5.3

159) Reginald enjoys hunting whitetail deer. He has a dilemma of deciding each morning where to locate his hunting stand. Reginald would like to choose the location that gives him the deer with the highest Pope and Young score in the smallest amount of time. Reginald will also kill the first deer he sees that offers any Pope and Young score. His utility is a function of the Pope and Young score (b), time in minutes spent hunting (t) and wealth in dollars (w) and is given by $U(b, t, w) = \frac{b^2}{10} - \frac{t}{6} + w$. If Reginald chooses stand A, he will kill a deer with Pope and Young score of 120 in 300 minutes. If Reginald chooses stand B, he will kill a deer with a Pope and Young score of 190 in 480 minutes. In dollars, how much would Reginald be willing to give up to learn of the outcomes from each stand?

Answer: If Reginald goes to stand A, his utility will be $w + 1{,}390$. If Reginald goes to stand B, his utility will be $w + 3{,}530$. Since \$1 of wealth is equal to 1 unit of utility, we see that Reginald would be willing to pay \$2,140 to learn about his outcomes at each stand and avoid going to stand A.

Diff: 2
Section: 5.3

160) Joan Summers has $100,000 to invest and is considering two alternatives. She can buy a risk free asset that will pay 10% or she can invest in a stock that has a 0.4 chance of paying 15%, a 0.3 chance of paying 18%, and a 0.3 chance of providing a 6% return. Joan plans to invest $70,000 in the stock and $30,000 in the risk free asset.

a. Determine the expected percentage return on the stock and the standard deviation.
b. Calculate the weighted average return on the portfolio, given the planned investment strategy outlined above.
c. Determine the standard deviation for the portfolio.
d. Write the equation that represents the budget line in the risk–return tradeoff. What is the slope of the budget line? Interpret this slope.

Answer: ***a.***

Expected return on stock:

$$0.4(15) + 0.3(18) + 0.3(6) = 13.2\%$$

Expected Return = 13.2% = $\hat{R}_S$

Standard Deviation For Stock:

$\hat{R}_I$	$\left[\hat{R}_i - \hat{R}_s\right]$	$\left[\hat{R}_i - \hat{R}_s\right]^2$	$\left[\hat{R}_i - \hat{R}_s\right]^2 P_1$
15	1.8	3.24	1.30
18	4.8	23.04	6.91
6	–7.2	51.84	15.55
			$\sigma^2 = 23.76$

$\sigma_S = 4.87$ where σ_S represents standard deviation of stock.

b.

weighted average portfolio return

$R_p = bR_S + (1 - b)R_F$

where b = proportion in risky asset

R_S = return on stock (13.2)

R_F = risk free

$$b = \frac{70{,}000}{100{,}000} = 0.7$$

$R_p = 0.7(13.2) + (1 - 0.7)(10)$

$R_p = 12.24$

c.

standard deviation for portfolios, σ_P

$\sigma_P = b\sigma_S$

$\sigma_P = 0.7(4.87)$

$\sigma_P = 3.41$

d.

$$R_p = R_F + \frac{R_S - R_F}{\sigma_S} \cdot \sigma_P$$

$$R_p = 10 + \frac{[13.2 - 10]}{4.87} \cdot 3.41$$

$$\text{Slope is } \frac{[R_S - R_F]}{\sigma_S} = \frac{[13.2 - 10]}{4.87} = 0.66$$

The slope represents the price of risk, since it tells how much extra risk must be accepted for a higher return.

Diff: 3
Section: 5.4

161) Mel and Christy are co–workers with different risk attitudes. Both have investments in the stock market and hold U.S. Treasury securities (which provide the risk free rate of return). Mel's marginal rate of substitution of return for risk

$\left(MU_{\sigma P} / \mathrm{MU}\, R_P, \sigma P\right)$ is $MRS^{M}_{R_P,\, \sigma P} = \dfrac{-4\sigma P}{R_P}$ where R_P is the individual's portfolio rate of return and σP is the individual's portfolio risk. Christy's

$MRS^{C}_{R_P,\, \sigma P} = \dfrac{-12\sigma P}{R_P}$. Each co–worker's budget constraint is $R_P = R_F + \dfrac{(R_m - R_f)}{\sigma_m}\sigma P$, where R_f is the risk–free rate of return, R_m is the stock market rate of return, and σ_m is the stock market risk. Solve for each co–worker's optimal portfolio rate of return as a function of R_f, R_m and σ_m.

Answer: We know that the slope of the indifference curve will be equal to the slope of the budget constraint at the optimal choice. This implies that for Mel:

$\dfrac{-4\sigma P}{R_P} = \dfrac{(R_m - R_f)}{\sigma_m} \Rightarrow \sigma P = \dfrac{(R_m - R_f)\, R_P}{4\sigma_m}$. We can then substitute this risk level into the budget constraint and solve for Mel's optimal portfolio return. This is done as follows:

$$R_P = R_f + \frac{(R_m - R_f)}{\sigma_m}\left[\frac{(R_m - R_f)\, R_P}{4\sigma_m}\right] R_P \Rightarrow R_P = \frac{R_F}{\left[1 - \dfrac{(R_m - R_f)^2}{4\sigma_m^2}\right]}.$$

We can perform the same techniques for Christy. That is,

$\dfrac{12\sigma P}{R_P} = \dfrac{(R_m - R_f)}{\sigma_m} \Rightarrow \sigma P = \dfrac{(R_m - R_f)\, R_P}{12\sigma_m}$.

Again, we can substitute this risk level into Christy's budget constraint and get:

$$R_P = R_f + \frac{(R_m - R_f)}{\sigma_m}\left[\frac{(R_m - R_f)}{12\sigma_m}\right] R_P \Rightarrow R_P = \frac{R_f}{\left[1 - \dfrac{(R_m - R_f)^2}{12\sigma_m^2}\right]}.$$

Diff: 2
Section: 5.4

162) Donna is considering the option of becoming a co–owner in a business. Her investment choices are to hold a risk free asset that has a return of R_f and co–ownership of the business, which has a rate of return of R_b and a level of risk of σ_b. Donna's marginal rate of substitution of return for risk

$\left(MU_{\sigma P} / MU_{R_P}\right)$ is $MRS_{R_P,\ \sigma P} = \frac{-\sigma P}{R_P}$ where R_P is Donna's portfolio rate of return and σP is her optimal portfolio risk. Donna's budget constraint is given by $R_P = R_f + \frac{(R_b - R_f)}{\sigma_b}\sigma P$. Solve for Donna's optimal portfolio rate of return and risk as a function of R_f, R_b and σ_b. Suppose the table below lists the relevant rates of returns and risks. Use this table to determine Donna's optimal rate or return and risk.

Investment	**Rate of Return**	**Risk**
Risk Free	0.06	0
Business	0.25	0.39

Answer: To find Donna's optimal portfolio return and portfolio risk, we need to first equate the slope of her indifference curve to the slope of her budget constraint. This implies $\frac{\sigma P}{R_P} = \frac{(R_b - R_f)}{\sigma_b} \Rightarrow \sigma P = \frac{R_b - R_f}{\sigma_b} R_p$. We may then substitute this level of portfolio risk into her budget constraint to find her optimal rate of return

$R_P = R_f + \frac{(R_b - R_f)^2}{\sigma_b^2} R_P \Rightarrow R_P = \frac{R_f}{\left[1 - \frac{(R_b - R_f)^2}{\sigma_b^2}\right]}$. We can plug this optimal portfolio return into the expression for portfolio risk above and get:

$\sigma P = \frac{\sigma_b R_f}{(R_b - R_f)}$. Using the values from the table, we see that Donna's optimal portfolio return is $R_P = \frac{0.06}{\left[1 - \frac{(0.25 - 0.06)^2}{0.39^2}\right]} = 0.079$. Donna's optimal portfolio risk is

$\sigma P = \frac{(0.39)(0.06)}{(0.25 - 0.06)} = 0.123$.

Diff: 2
Section: 5.4

Chapter 6 Production

1) A production function defines the output that can be produced
   A) at the lowest cost, given the inputs available.
   B) for the average firm.
   C) if the firm is technically efficient.
   D) in a given time period if no additional inputs are hired.
   E) as technology changes over time.

Answer: C
Diff: 2
Section: 6.1

2) A production function assumes a given
   A) technology.
   B) set of input prices.
   C) ratio of input prices.
   D) amount of capital and labor.
   E) amount of output.

Answer: A
Diff: 1
Section: 6.1

3) A function that indicates the maximum output per unit of time that a firm can produce, for every combination of inputs with a given technology, is called
   A) an isoquant.
   B) a production possibility curve.
   C) a production function.
   D) an isocost function.

Answer: C
Diff: 1
Section: 6.1

4) Use the following two statements to answer this question:
   I. Production functions describe what is technically feasible when the firm operates efficiently.
   II. The production function shows the least cost method of producing a given level of output.
   A) Both I and II are true.
   B) I is true, and II is false.
   C) I is false, and II is true.
   D) Both I and II are false.

Answer: B
Diff: 1
Section: 6.1

5) A farmer uses L units of labor and K units of capital to produce Q units of corn using a production function F(K,L). A production plan that uses K' = L' = 10 to produce Q' units of corn where
Q' < F(10, 10) is said to be
A) technically feasible and efficient.
B) technically unfeasible and efficient.
C) technically feasible and inefficient.
D) technically unfeasible and inefficient.
E) none of the above

Answer: C
Diff: 2
Section: 6.1

6) Which of the following inputs are variable in the long run?
A) labor.
B) capital and equipment.
C) plant size.
D) all of these.

Answer: D
Diff: 1
Section: 6.1

7) The short run is
A) less than a year.
B) three years.
C) however long it takes to produce the planned output.
D) a time period in which at least one input is fixed.
E) a time period in which at least one set of outputs has been decided upon.

Answer: D
Diff: 1
Section: 6.1

8) Joe owns a small coffee shop, and his production function is q = 3KL where q is total output in cups per hour, K is the number of coffee machines (capital), and L is the number of employees hired per hour (labor). If Joe's capital is currently fixed at K=3 machines, what is his short-run production function?
A) $q = 3L$
B) $q = 3L^2$
C) $q = 9L$
D) $q = 3K^2$

Answer: C
Diff: 1
Section: 6.1

9) Suppose there are ten identical manufacturing firms that produce computer chips with machinery (capital, K) and labor (L), and each firm has a production function of the form $q = 10KL^{0.5}$. What is the industry-level production function?
A) $Q = 10K^{10}L^5$
B) $Q = 100KL^{0.5}$
C) $Q = 100L^{0.5}$
D) none of the above

Answer: B
Diff: 1
Section: 6.1

10) For many firms, capital is the production input that is typically fixed in the short run. Which of the following firms would face the longest time required to adjust its capital inputs?
A) Firm that makes DVD players.
B) Computer chip fabricator
C) Flat–screen TV manufacturer
D) Nuclear power plant

Answer: D
Diff: 2
Section: 6.1

11) We manufacturer automobiles given the production function q = 5KL where q is the number of autos assembled per eight–hour shift, K is the number of robots used on the assembly line (capital) and L is the number of workers hired per hour (labor). If we use K=10 robots and L=10 workers in order to produce q = 450 autos per shift, then we know that production is:
A) technologically efficient.
B) technologically inefficient.
C) maximized.
D) optimal.

Answer: B
Diff: 1
Section: 6.1

12) Writing total output as Q, change in output as $\triangle$Q, total labor employment as L, and change in labor employment as $\triangle$L, the marginal product of labor can be written algebraically as
A) $\Delta Q \cdot L$.
B) Q / L.
C) $\Delta L / \Delta Q$.
D) $\Delta Q / \Delta L$.

Answer: D
Diff: 1
Section: 6.2

13) The slope of the total product curve is the
A) average product.
B) slope of a line from the origin to the point.
C) marginal product.
D) marginal rate of technical substitution.

Answer: C
Diff: 1
Section: 6.2

14) The law of diminishing returns refers to diminishing
A) total returns.
B) marginal returns.
C) average returns.
D) all of these.

Answer: B
Diff: 1
Section: 6.2

15) When labor usage is at 12 units, output is 36 units. From this we may infer that
A) the marginal product of labor is 3.
B) the total product of labor is 1/3.
C) the average product of labor is 3.
D) none of the above

Answer: C
Diff: 1
Section: 6.2

16) The marginal product of an input is
A) total product divided by the amount of the input used to produce this amount of output.
B) the addition to total output that adds nothing to total revenue.
C) the addition to total output that adds nothing to profit.
D) the addition to total output due to the addition of one unit of all other inputs.
E) the addition to total output due to the addition of the last unit of an input, holding all other inputs constant.

Answer: E
Diff: 1
Section: 6.2

17) When the average product is decreasing, marginal product
A) equals average product.
B) is increasing.
C) exceeds average product.
D) is decreasing.
E) is less than average product.

Answer: E
Diff: 2
Section: 6.2

18) Technological improvement
A) can hide the presence of diminishing returns.
B) can be shown as a shift in the total product curve.
C) allows more output to be produced with the same combination of inputs.
D) All of the above are true.

Answer: D
Diff: 1
Section: 6.2

19) Which of the following ideas were central to the conclusions drawn by Thomas Malthus in his 1798 "Essay on the Principle of Population"?
A) Short–run time period
B) Shortage of labor
C) Law of diminishing resource availability
D) Law of diminishing returns

Answer: D
Diff: 1
Section: 6.2

20) The law of diminishing returns assumes that
A) there is at least one fixed input.
B) all inputs are changed by the same percentage.
C) additional inputs are added in smaller and smaller increments.
D) all inputs are held constant.

Answer: A
Diff: 1
Section: 6.2

21) According to the law of diminishing returns
A) the total product of an input will eventually be negative.
B) the total product of an input will eventually decline.
C) the marginal product of an input will eventually be negative.
D) the marginal product of an input will eventually decline.
E) none of the above

Answer: D
Diff: 1
Section: 6.2

22) Use the following two statements to answer this question:
I. The marginal product of labor is the slope of the line from the origin to the total product curve at that level of labor usage.
II The average product of labor is the slope of the line that is tangent to the total product curve at that level of labor usage.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: D
Diff: 1
Section: 6.2

23) In a certain textile firm, labor is the only short term variable input. The manager notices that the marginal product of labor is the same for each unit of labor, which implies that
A) the average product of labor is always greater that the marginal product of labor
B) the average product of labor is always equal to the marginal product of labor
C) the average product of labor is always less than the marginal product of labor
D) as more labor is used, the average product of labor falls
E) there is no unambiguous relationship between labor's marginal and average products.

Answer: B
Diff: 2
Section: 6.2

24) At a given level of labor employment, knowing the difference between the average product of labor and the marginal product of labor tells you
A) whether increasing labor use raises output.
B) whether increasing labor use changes the marginal product of labor.
C) whether economies of scale exist.
D) whether the law of diminishing returns applies.
E) how increasing labor use alters the average product of labor.

Answer: E
Diff: 2
Section: 6.2

25) If the law of diminishing returns applies to labor then
A) the marginal product of labor must eventually become negative.
B) the average product of labor must eventually become negative.
C) the marginal product of labor must rise and then fall as employment rises.
D) the average product of labor must rise and then fall as employment increases.
E) after some level of employment, the marginal product of labor must fall.

Answer: E
Diff: 1
Section: 6.2

26) The law of diminishing returns applies to
A) the short run only.
B) the long run only.
C) both the short and the long run.
D) neither the short nor the long run.
E) all inputs, with no reference to the time period.

Answer: A
Diff: 1
Section: 6.2

27) The Malthusian dilemma relates to marginal product in that
A) starvation can be averted only if marginal product is constant.
B) because of diminishing marginal product, the amount of food produced by each additional member of the population increases.
C) because of diminishing marginal product, the amount of food produced by each additional member of the population decreases.
D) because of diminishing marginal product, the wage falls as the population decreases.
E) because of diminishing average product, the population will not have additional capital to work with.

Answer: C
Diff: 2
Section: 6.2

28) Marginal product crosses the horizontal axis (is equal to zero) at the point where
A) average product is maximized.
B) total product is maximized.
C) diminishing returns set in.
D) output per worker reaches a maximum.
E) All of the above are true.

Answer: B
Diff: 2
Section: 6.2

29) Assume that average product for six workers is fifteen. If the marginal product of the seventh worker is eighteen,
A) marginal product is rising.
B) marginal product is falling.
C) average product is rising.
D) average product is falling.

Answer: C
Diff: 2
Section: 6.2

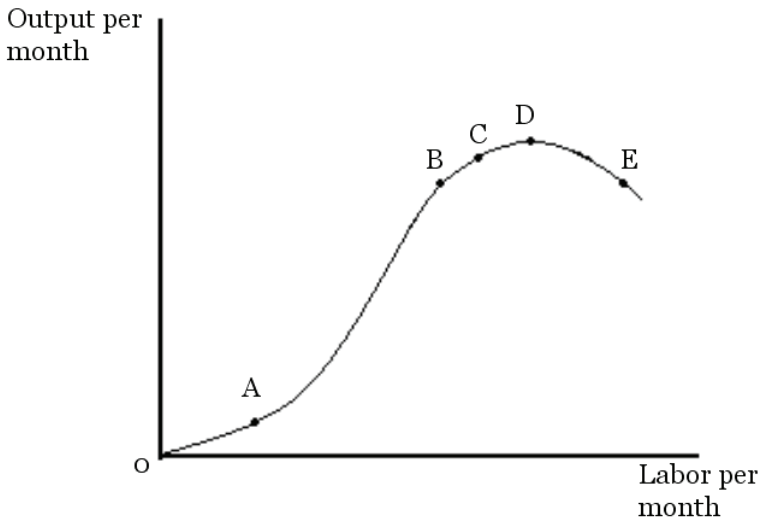


Figure 6.1

30) Refer to Figure 6.1. At point A, the marginal product of labor is
A) rising. B) at its minimum.
C) at its maximum. D) diminishing.

Answer: A
Diff: 2
Section: 6.2

31) Refer to Figure 6.1. At which point on the total product curve is the average product of labor the highest?
A) point A.
B) point B.
C) point C.
D) point D.
E) none of the above

Answer: B
Diff: 2
Section: 6.2

32) Refer to Figure 6.1. Which of the following statements is false?
A) At point E the marginal product of labor is decreasing.
B) At point E the marginal product of labor is negative.
C) At point E the average product of labor is decreasing.
D) At point E the average product of labor is negative.
E) At point E the marginal product of labor is less than the average product of labor.

Answer: D
Diff: 3
Section: 6.2

33) Refer to Figure 6.1. At point C
A) the marginal product of labor is greater than the average product of labor.
B) the average product of labor is greater than the marginal product of labor.
C) the marginal product of labor and the average product of labor are equal.
D) the marginal product of labor and the average product of labor are both increasing.
E) Both B and D are correct.

Answer: B
Diff: 3
Section: 6.2

34) For consideration of such issues as labor's productivity growth nationwide, the relevant measure is the
A) marginal product of labor.
B) average product of labor.
C) total product of labor.
D) wage.
E) cost of capital.

Answer: B
Diff: 2
Section: 6.2

35) The link between the productivity of labor and the standard of living is
A) tenuous and changing.
B) inverse.
C) that over the long run consumers as a whole can increase their rate of consumption only by increasing labor productivity.
D) that over the long run consumers' rate of consumption is not related to labor productivity.
E) that the productivity of labor grows much more erratically than the standard of living.

Answer: C
Diff: 2
Section: 6.2

36) Which would not increase the productivity of labor?
A) An increase in the size of the labor force
B) An increase in the quality of capital
C) An increase in the quantity of capital
D) An increase in technology
E) An increase in the efficiency of energy

Answer: A
Diff: 2
Section: 6.2

37) One of the factors contributing to the fact that labor productivity is higher in the U.S. than in the People's Republic of China is
A) China's larger stock of capital.
B) the higher capital/labor ratio in China.
C) the higher capital/labor ratio in the U.S.
D) China's smaller stock of fossil fuels.
E) the fact that much labor in the U.S. is in management.

Answer: C
Diff: 2
Section: 6.2

38) What describes the graphical relationship between average product and marginal product?
A) Average product cuts marginal product from above, at the maximum point of marginal product.
B) Average product cuts marginal product from below, at the maximum point of marginal product.
C) Marginal product cuts average product from above, at the maximum point of average product.
D) Marginal product cuts average product from below, at the maximum point of average product.
E) Average and marginal product do not intersect.

Answer: C
Diff: 3
Section: 6.2

39) Consider the following statements when answering this question;
I. Suppose a semiconductor chip factory uses a technology where the average product of labor is constant for all employment levels. This technology obeys the law of diminishing returns.
II. Suppose a semiconductor chip factory uses a technology where the marginal product of labor rises, then is constant and finally falls as employment increases. This technology obeys the law of diminishing returns.
A) I is true, and II is false.
B) I is false, and II is true.
C) Both I and II are true.
D) Both I and II are false.

Answer: B
Diff: 3
Section: 6.2

40) Consider the following statements when answering this question;
I. Whenever the marginal product of labor curve is a downward sloping curve, the average product of labor curve is also a downward sloping curve that lies above the marginal product of labor curve.
II. If a firm uses only labor to produce, and the production function is given by a straight line, then the marginal product of labor always equals the average product of labor as labor employment expands.
A) I is true, and II is false.
B) I is false, and II is true.
C) Both I and II are true.
D) Both I and II are false.

Answer: B
Diff: 3
Section: 6.2

41) You operate a car detailing business with a fixed amount of machinery (capital), but you have recently altered the number of workers that you employ per hour. Three employees can generate an average product of 4 cars per person in each hour, and five employees can generate an average product of 3 cars per person in each hour. What is the marginal product of labor as you increase the labor from three to five employees?

A) MP = 3 cars B) MP = 1.5 cars C) MP = 15 cars D) MP = –1 cars

Answer: B
Diff: 3
Section: 6.2

42) You operate a car detailing business with a fixed amount of machinery (capital), but you have recently altered the number of workers that you employ per hour. As you increased the number of employees hired per hour from three to five, your total output increased by 5 cars to 15 cars per hour. What is the average product of labor at the new levels of labor?

A) AP = 3 cars per worker
B) AP = 5 cars per worker
C) AP = 4 cars per worker
D) We do not have enough information to answer this question.

Answer: A
Diff: 1
Section: 6.2

43) An important factor that contributes to labor productivity growth is:

A) growth in the capital stock.
B) technological change.
C) the standard of living.
D) A and B only
E) A, B, and C are correct.

Answer: D
Diff: 1
Section: 6.2

44) Joe owns a coffee house and produces coffee drinks under the production function q = 5KL where q is the number of cups generated per hour, K is the number of coffee machines (capital), and L is the number of employees hired per hour (labor). What is the average product of labor?

A) AP = 5 B) AP = 5K C) AP = 5L D) AP = 5K/L

Answer: B
Diff: 2
Section: 6.2

45) Joe owns a coffee house and produces coffee drinks under the production function q = 5KL where q is the number of cups generated per hour, K is the number of coffee machines (capital), and L is the number of employees hired per hour (labor). What is the marginal product of labor?

A) MP = 5 B) MP = 5K C) MP = 5L D) MP = 5K/L

Answer: B
Diff: 2
Section: 6.2

46) Joe owns a coffee house and produces coffee drinks under the production function q = 5KL where q is the number of cups generated per hour, K is the number of coffee machines (capital), and L is the number of employees hired per hour (labor). The average product of labor and the marginal product of labor are both equal to AP = MP = 5K. Does labor exhibit diminishing marginal returns in this case?

A) Yes, if capital also exhibits diminishing marginal returns.
B) Yes, this is true for all values of K.
C) No, the marginal product of labor is constant (for a given K).
D) No, the marginal product of labor is increasing (for a given K).

Answer: C
Diff: 2
Section: 6.2

47) An isoquant

A) must be linear.
B) cannot have a negative slope.
C) is a curve that shows all the combinations of inputs that yield the same total output.
D) is a curve that shows the maximum total output as a function of the level of labor input.
E) is a curve that shows all possible output levels that can be produced at the same cost.

Answer: C
Diff: 1
Section: 6.3

48) If we take the production function and hold the level of output constant, allowing the amounts of capital and labor to vary, the curve that is traced out is called:

A) the total product.
B) an isoquant.
C) the average product.
D) the marginal product.
E) none of the above

Answer: B
Diff: 1
Section: 6.3

49) Use the following two statements to answer this question:

I. Isoquants cannot cross one another.
II. An isoquant that is twice the distance from the origin represents twice the level of output.

A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: B
Diff: 2
Section: 6.3

50) A firm uses two factors of production. Irrespective of how much of each factor is used, both factors always have positive marginal products which imply that
A) isoquants are relevant only in the long run
B) isoquants have negative slope
C) isoquants are convex
D) isoquants can become vertical or horizontal
E) none of the above

Answer: B
Diff: 3
Section: 6.3

51) Use the following statements to answer this question.
I. The numerical labels attached to indifference curves are meaningful only in an ordinal way.
II. The numerical labels attached to isoquants are meaningful only in an ordinal way.
A) both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) both I and II are false.

Answer: B
Diff: 1
Section: 6.3

52) The function which shows combinations of inputs that yield the same output is called a(n)
A) isoquant curve.
B) isocost curve.
C) production function.
D) production possibilities frontier.

Answer: A
Diff: 1
Section: 6.3

53) Two isoquants, which represent different output levels but are derived from the same production function, cannot cross because
A) isoquants represent different utility levels
B) this would violate a technical efficiency condition
C) isoquants are downward sloping
D) additional inputs will not be used by profit maximizing firms if those inputs decrease output
E) Both B and D are true.

Answer: E
Diff: 3
Section: 6.3

54) An upward sloping isoquant
A) can be derived from a production function with one input
B) can be derived from a production function that uses more than one input where reductions in the use of any input always reduces output
C) cannot be derived from a production function when a firm is assumed to maximize profits
D) can be derived whenever one input to production is available at zero cost to the firm
E) none of the above

Answer: C
Diff: 2
Section: 6.3

55) Use the following two statements to answer this question:
I. If the marginal product of labor is zero, the total product of labor is at its maximum.
II If the marginal product of labor is at its maximum, the average product of labor is falling.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: B
Diff: 2
Section: 6.3

56) As we move downward along a typical isoquant, the slope of the isoquant
A) becomes flatter.
B) becomes steeper.
C) remains constant.
D) becomes linear.

Answer: A
Diff: 1
Section: 6.3

57) The rate at which one input can be reduced per additional unit of the other input, while holding output constant, is measured by the
A) marginal rate of substitution.
B) marginal rate of technical substitution.
C) slope of the isocost curve.
D) average product of the input.

Answer: B
Diff: 1
Section: 6.3

58) If capital is measured on the vertical axis and labor is measured on the horizontal axis, the slope of an isoquant can be interpreted as the
A) rate at which the firm can replace capital with labor without changing the output rate.
B) average rate at which the firm can replace capital with labor without changing the output rate.
C) marginal product of labor.
D) marginal product of capital.

Answer: A
Diff: 1
Section: 6.3

59) The marginal rate of technical substitution is equal to the
A) slope of the total product curve.
B) change in output minus the change in labor.
C) change in output divided by the change in labor.
D) ratio of the marginal products of the inputs.

Answer: D
Diff: 1
Section: 6.3

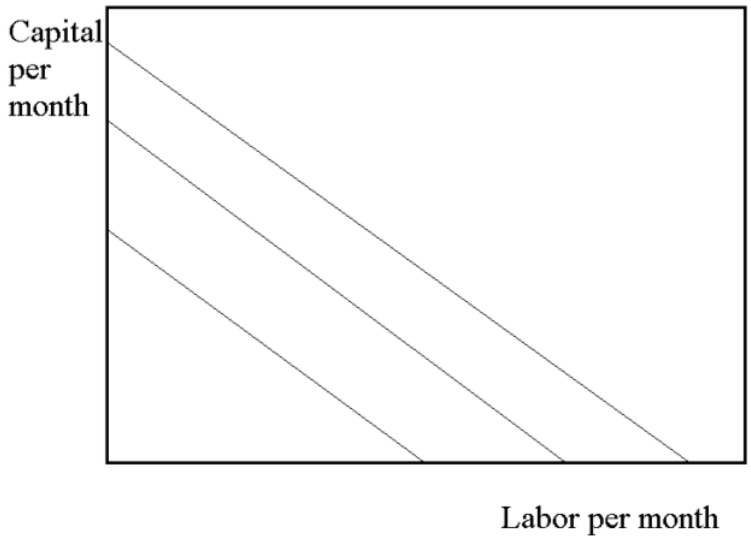
60) If the isoquants are straight lines, then
A) inputs have fixed costs at all use rates.
B) the marginal rate of technical substitution of inputs is constant.
C) only one combination of inputs is possible.
D) there are constant returns to scale.

Answer: B
Diff: 1
Section: 6.3

61) A production function in which the inputs are perfectly substitutable would have isoquants that are
A) convex to the origin.
B) L–shaped.
C) linear.
D) concave to the origin.

Answer: C
Diff: 1
Section: 6.3

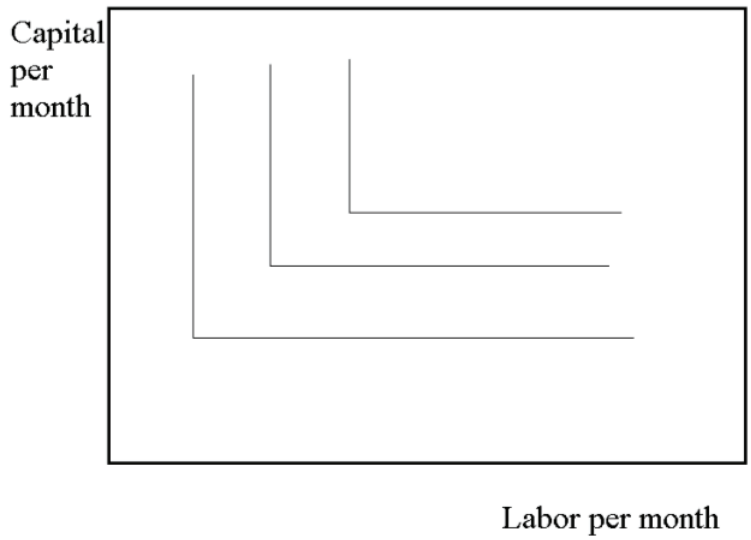
62) An examination of the production isoquants in the diagram below reveals that:



A) capital and labor must be used in fixed proportions.
B) capital and labor are perfectly substitutable.
C) except at the corners of the isoquants the MRTS is constant.
D) Both B and C are correct.
E) none of the above

Answer: D
Diff: 1
Section: 6.3

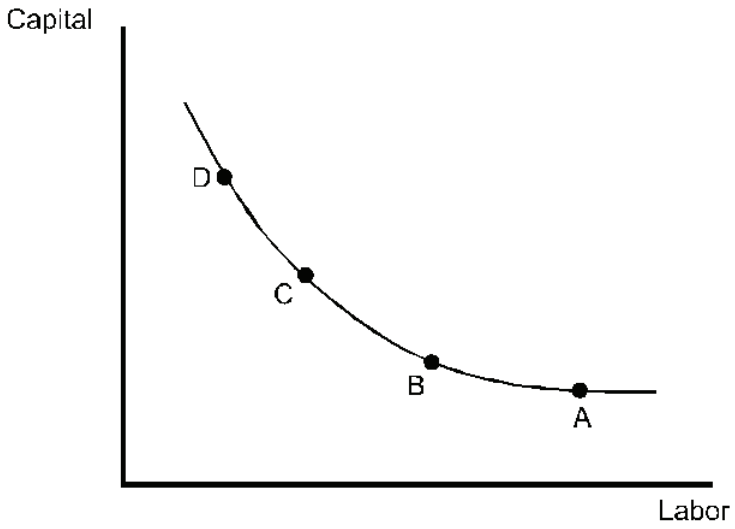
63) An examination of the production isoquants in the diagram below reveals that:



A) capital and labor will be used in fixed proportions.
B) Capital and labor are perfectly substitutable.
C) the MRTS is constant.
D) Both B and C are correct.
E) none of the above

Answer: A
Diff: 1
Section: 6.3

64) The diagram below shows an isoquant for the production of wheat.



Which point has the highest marginal productivity of labor?
A) Point A B) Point B C) Point C D) Point D

Answer: D
Diff: 1
Section: 6.3

65) Which of the following is NOT related to the slope of isoquants?
A) The fact that inputs have positive marginal product
B) The fact that inputs have diminishing marginal product
C) The fact that input prices are positive
D) The fact that more of either input increases output
E) The fact that there are diminishing returns to inputs

Answer: C
Diff: 2
Section: 6.3

66) The marginal rate of technical substitution is equal to:
A) the absolute value of the slope of an isoquant.
B) the ratio of the marginal products of the inputs.
C) the ratio of the prices of the inputs.
D) all of the above
E) A and B only

Answer: E
Diff: 2
Section: 6.3

67) A firm's marginal product of labor is 4 and its marginal product of capital is 5. If the firm adds one unit of labor, but does not want its output quantity to change, the firm should
A) use five fewer units of capital.
B) use 0.8 fewer units of capital.
C) use 1.25 fewer units of capital.
D) add 1.25 units of capital.

Answer: B
Diff: 2
Section: 6.3

68) A straight–line isoquant
A) is impossible.
B) would indicate that the firm could switch from one output to another costlessly.
C) would indicate that the firm could not switch from one output to another.
D) would indicate that capital and labor cannot be substituted for each other in production.
E) would indicate that capital and labor are perfect substitutes in production.

Answer: E
Diff: 2
Section: 6.3

69) An L–shaped isoquant
A) is impossible.
B) would indicate that the firm could switch from one output to another costlessly.
C) would indicate that the firm could not switch from one output to another.
D) would indicate that capital and labor cannot be substituted for each other in production.
E) would indicate that capital and labor are perfect substitutes in production.

Answer: D
Diff: 2
Section: 6.3

70) If the isoquants in an isoquant map are downward sloping but bowed away from the origin (i.e., concave to the origin), then the production technology violates the assumption of:
A) technical efficiency.
B) free disposal.
C) diminishing marginal returns.
D) positive average product.

Answer: C
Diff: 2
Section: 6.3

71) The MRTS for isoquants in a fixed–proportion production function is:
A) zero or one.
B) always zero.
C) always one.
D) zero or undefined.

Answer: D
Diff: 2
Section: 6.3

72) A construction company builds roads with machinery (capital, K) and labor (L). If we plot the isoquants for the production function so that labor is on the horizontal axis, then a point on the isoquant with a small MRTS (in absolute value) is associated with high _____ use and low _____ use.

A) labor, capital
B) capital, labor
C) concrete, gravel
D) none of the above

Answer: A
Diff: 2
Section: 6.3

73) Which of the following examples represents a fixed–proportion production system with capital and labor inputs?

A) Clerical staff and computers
B) Airplanes and pilots
C) Horse–drawn carriages and carriage drivers
D) all of the above

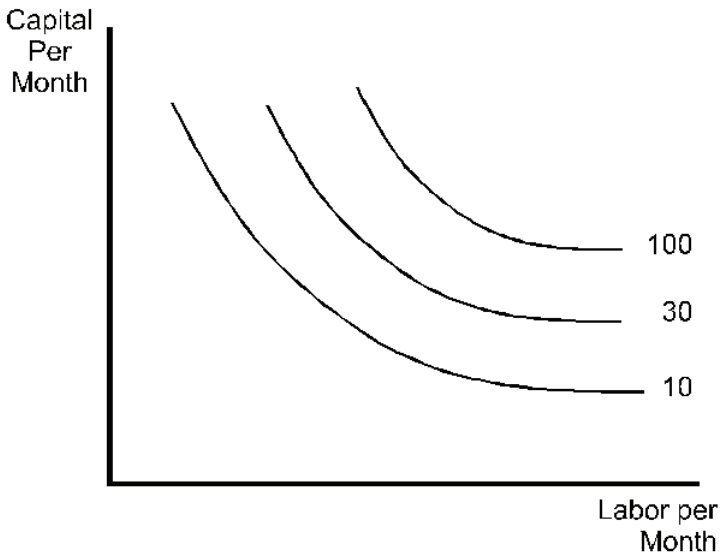
Answer: D
Diff: 2
Section: 6.3

74) You are currently using three printing presses and five employees to print 100 sales manuals per hour. If the MRTS at this point is –0.5, then you would be willing to exchange _____ employees for two more printing presses in order to maintain current output.

A) zero
B) one
C) two
D) three

Answer: B
Diff: 1
Section: 6.3

75) According to the diagram below, where each isoquant's output level is marked to the right of the isoquant, production is characterized by



A) decreasing returns to scale.
B) constant returns to scale.
C) increasing returns to scale.
D) increasing, constant and decreasing returns to scale.

Answer: C
Diff: 1
Section: 6.4

76) In a production process, all inputs are increased by 10%; but output increases less than 10%. This means that the firm experiences

A) decreasing returns to scale.
B) constant returns to scale.
C) increasing returns to scale.
D) negative returns to scale.

Answer: A
Diff: 1
Section: 6.4

77) Increasing returns to scale in production means

A) more than 10% as much of all inputs are required to increase output 10%.
B) less than twice as much of all inputs are required to double output.
C) more than twice as much of only one input is required to double output.
D) isoquants must be linear.

Answer: B
Diff: 1
Section: 6.4

78) With increasing returns to scale, isoquants for unit increases in output become

A) farther and farther apart.
B) closer and closer together.
C) the same distance apart.
D) none of these.

Answer: B
Diff: 1
Section: 6.4

79) Use the following two statements to answer this question:

I. "Decreasing returns to scale" and "diminishing returns to a factor of production" are two phrases that mean the same thing.

II Diminishing returns to all factors of production implies decreasing returns to scale.

A) Both I and II are true. B) I is true, and II is false.

C) I is false, and II is true. D) Both I and II are false.

Answer: D
Diff: 3
Section: 6.4

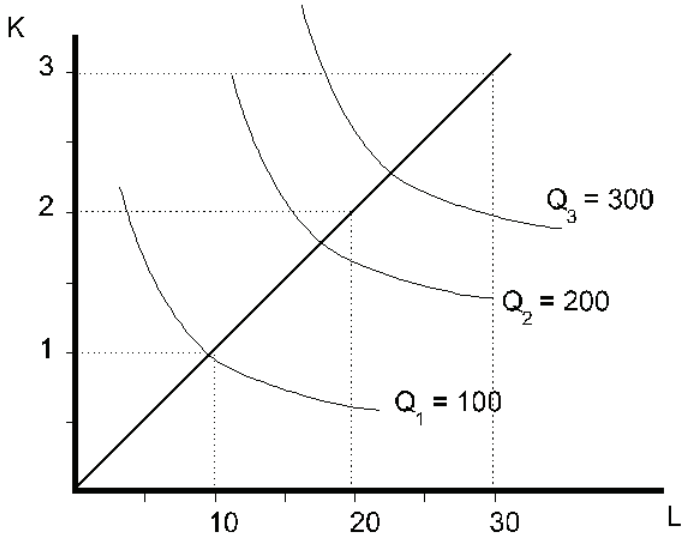


Figure 6.2

80) Refer to Figure 6.2. The situation pictured is one of

A) constant returns to scale, because the line through the origin is linear.

B) decreasing returns to scale, because the isoquants are convex.

C) decreasing returns to scale, because doubling inputs results in less than double the amount of output.

D) increasing returns to scale, because the isoquants are convex.

E) increasing returns to scale, because doubling inputs results in more than double the amount of output.

Answer: E
Diff: 2
Section: 6.4

81) The situation pictured in Figure 6.2

A) is one of increasing marginal returns to labor.

B) is one of increasing marginal returns to capital.

C) is consistent with diminishing marginal product.

D) contradicts the law of diminishing marginal product.

E) shows decreasing returns to scale.

Answer: C
Diff: 3
Section: 6.4

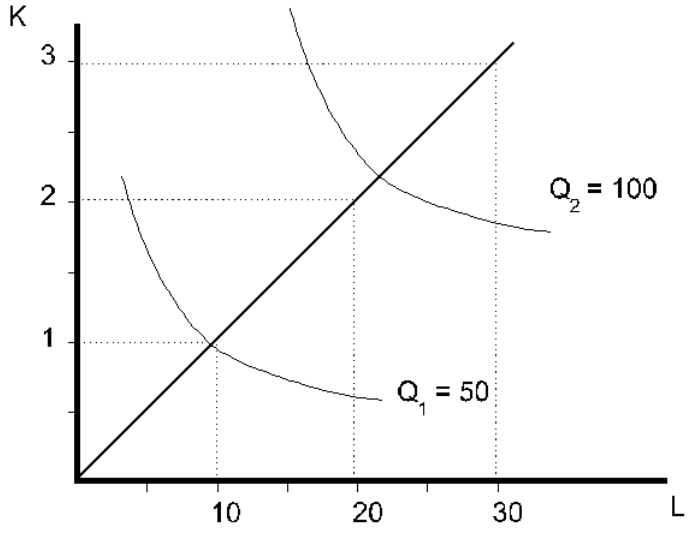


Figure 6.3

82) Refer to Figure 6.3. The situation pictured is one of
A) constant returns to scale, because the line through the origin is linear.
B) decreasing returns to scale, because the isoquants are convex.
C) decreasing returns to scale, because doubling inputs results in less than double the amount of output.
D) increasing returns to scale, because the isoquants are convex.
E) increasing returns to scale, because doubling inputs results in more than double the amount of output.

Answer: C
Diff: 2
Section: 6.4

83) The situation pictured in Figure 6.3
A) is one of increasing marginal returns to labor.
B) is one of increasing marginal returns to capital.
C) is not consistent with diminishing marginal product of labor or capital.
D) shows constant returns to scale.
E) shows diminishing marginal products of labor and capital.

Answer: E
Diff: 2
Section: 6.4

84) A farmer uses M units of machinery and L hours of labor to produce C tons of corn, with the following production function $C = L^{0.5}M^{0.75}$. This production function exhibits
A) decreasing returns to scale for all output levels
B) constant returns to scale for all output levels
C) increasing returns to scale for all output levels
D) no clear pattern of returns to scale

Answer: C
Diff: 3
Section: 6.4

85) If input prices are constant, a firm with increasing returns to scale can expect
A) costs to double as output doubles.
B) costs to more than double as output doubles.
C) costs to go up less than double as output doubles.
D) to hire more and more labor for a given amount of capital, since marginal product increases.
E) to never reach the point where the marginal product of labor is equal to the wage.

Answer: C
Diff: 3
Section: 6.4

86) A farmer uses M units of machinery and L hours of labor to produce C tons of corn, with the following production function $C = L^{0.5} + M^{0.75}$. This production function exhibits
A) decreasing returns to scale for all output levels.
B) constant returns to scale for all output levels.
C) increasing returns to scale for all output levels.
D) no clear pattern of returns to scale.

Answer: A
Diff: 3
Section: 6.4

87) Consider the following statements when answering this question;
I. If a technology exhibits diminishing returns then it also exhibits decreasing return to scale.
II. If a technology exhibits decreasing returns to scale then it also exhibits diminishing returns.
A) I is true, and II is false.
B) I is false, and II is true.
C) Both I and II are true.
D) Both I and II are false.

Answer: D
Diff: 3
Section: 6.4

88) The textbook discusses the carpet industry situated in the southeastern U.S., and the authors indicate that smaller carpet mills have _____ returns to scale while larger mills have _____ returns to scale.
A) increasing, decreasing
B) increasing, constant
C) constant, decreasing
D) constant, increasing

Answer: D
Diff: 2
Section: 6.4

89) Which scenario below would lead to lower profits as we double the inputs used by the firm?
A) Increasing returns to scale with constant input prices
B) Constant returns to scale with constant input prices
C) Constant returns to scale with rising input prices (perhaps because the firm is not a price–taker in the input markets)
D) all of the above

Answer: C
Diff: 2
Section: 6.4

90) Which of the following production functions exhibits constant returns to scale?

A) $q = KL$ B) $q = KL^{0.5}$ C) $q = K + L$ D) $q = \log(KL)$

Answer: C
Diff: 2
Section: 6.4

91) Does it make sense to consider the returns to scale of a production function in the short run?

A) Yes, this is an important short–run characteristic of production functions.
B) Yes, returns to scale determine the diminishing marginal returns of the inputs.
C) No, returns to scale is a property of the consumer's utility function.
D) No, we cannot change all of the production inputs in the short run.

Answer: D
Diff: 2
Section: 6.4

92) Use the following statements to answer this question:

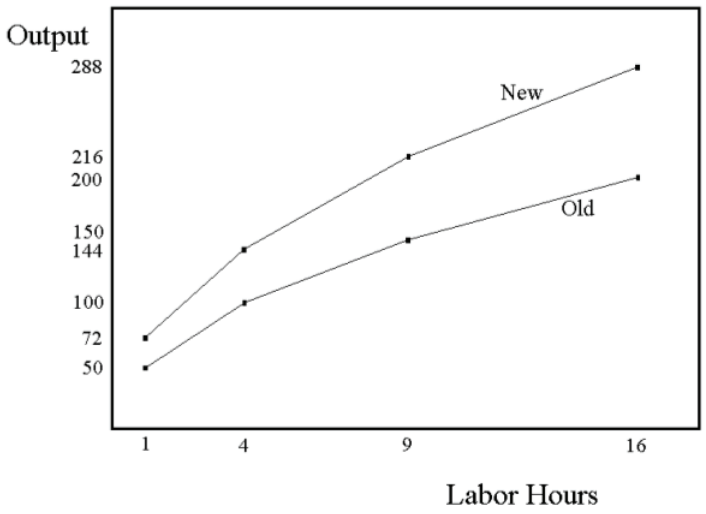
I. We cannot measure the returns to scale for a fixed–proportion production function.
II. Production functions with inputs that are perfect substitutes always exhibit constant returns to scale.

A) I and II are true. B) I is true and II is false.
C) II is true and I is false. D) I and II are false.

Answer: D
Diff: 2
Section: 6.4

93) Ronald's Outboard Motor Manufacturing plant production function is $y(K, L) = 25\sqrt{KL}$. Ronald is investigating a new outboard motor manufacturing technique. Ronald believes that if he adopts the new technique, his production function for outboard motors will become: $y(K, L) = 36\sqrt{KL}$. Given that Ronald uses 4 units of machine hours, sketch his production function with the old technique and the new technique as he increases labor hours. With the new technique, do labor hours contribute more to production?

Answer:

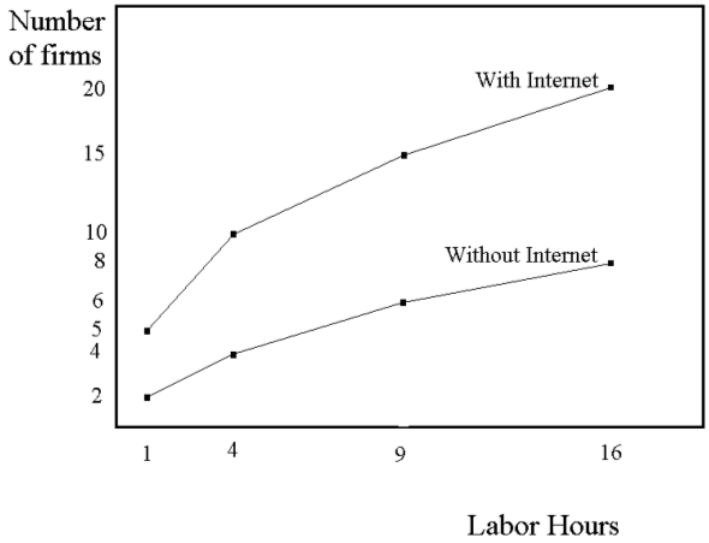


The slope of the new production function is steeper for all labor uses. This implies the marginal product of labor is higher for the new technique. This means that labor hours are contributing at a higher rate for the new technique.

Diff: 2
Section: 6.1

94) Wally describes himself as a resilient fundamentalist when it comes to making investments in the stock market. At the moment, Wally uses only periodicals from the library when analyzing corporate fundamentals. The number of firms he can analyze in a day is given by the function: $y(L) = 2\sqrt{L}$, where L is the number of hours a day he works. Sketch Wally's total number of firms analyzed as he increases his hours of work. If Wally begins using internet sources to learn about corporate fundamentals, the number of firms he can analyze in a day is given by the function: $y(L) = 5\sqrt{L}$ Sketch Wally's total number of firms analyzed as he increases his hours of work and uses the internet.

Answer:



Diff: 1
Section: 6.1

95) Complete the following table:

Quantity Of Variable Input	Total Output	Marginal Product of Variable Input	Average Product of Variable Input
0	0		
1	100		
2	190		
3	270		
4	330		
5	360		
6	380		

Answer:

Quantity Of Variable Input	Total Output	Marginal Product of Variable Input	Average Product of Variable Input
0	0	–	–
1	100	100	100
2	190	90	95
3	270	80	90
4	330	60	82.5
5	360	30	72
6	380	20	63.3

Diff: 1
Section: 6.2

96) Complete the following table:

Quantity Of Variable Input	Total Output	Marginal Product of Variable Input	Average Product of Variable Input
0	0	–	–
1			50
2		30	
3	90		
4			24
5		4	
6	96		

Answer:

Quantity Of Variable Input	Total Output	Marginal Product of Variable Input	Average Product of Variable Input
0	0	–	–
1	50	50	50
2	80	30	40
3	90	10	30
4	96	6	24
5	100	4	20
6	96	-4	16

Diff: 2
Section: 6.2

97) A bakery operating in the short run has found that when the level of employment in its baking room was increased from 4 to 10, in increments of one, its corresponding levels of production of bread were 110, 115, 122, 127, 130, 132, and 133.

a. Calculate the marginal product of labor.
b. Explain whether this production function exhibits diminishing marginal productivity of labor.

Answer: ***a.***

L	TP	MP
4	110	
		5
5	115	
		7
6	122	
		5
7	127	
		3
8	130	
		2
9	132	
		1
10	133	

b.
This production function does exhibit diminishing returns to labor. Inputs of labor of 7 and greater units produce diminishing marginal returns, because the MP of labor is decreasing in this input range.

Diff: 1
Section: 6.2

98) The production function of pizzas for One Guy's Pizza shop is $y(K, L) = 4\sqrt{KL}$. K represents the number of ovens One Guy's Pizza uses and is fixed in the short–run at 4 ovens. L represents the number of labor hours One Guy's Pizza employees and is variable in the short and long–run. Fill in the empty columns in the table below.

Pizzas	**K**	**L**	$MP_L(L, K) = \frac{2\sqrt{K}}{\sqrt{L}}$	$MP_K(K, L) = \frac{2\sqrt{L}}{\sqrt{K}}$
	4	1		
	4	4		
	4	9		
	4	16		

Answer:

Pizzas	**K**	**L**	$MP_L(L, K) = \frac{2\sqrt{K}}{\sqrt{L}}$	$MP_K(K, L) = \frac{2\sqrt{L}}{\sqrt{K}}$
8	4	1	4	1
16	4	4	2	2
24	4	9	$\frac{4}{3}$	3
32	4	16	1	4

Diff: 1
Section: 6.2

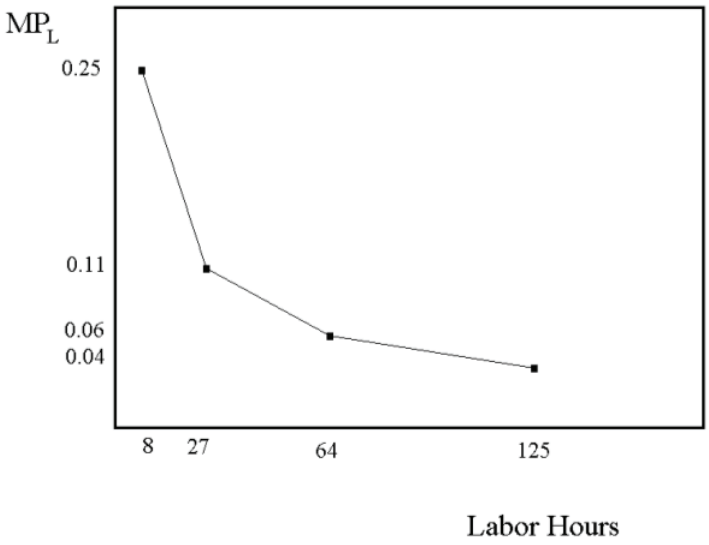
99) The production function for Cogswell Cogs is $y(K, L) = \sqrt{K}\sqrt[3]{L}$. K represents the number of robot hours used in the production process while L represents the number of labor hours. The marginal productivity of a labor hour is $MP_L = \frac{\sqrt{K}}{3L^{2/3}}$ Fill in the empty columns in the table below. Use the information in the table to sketch Cogswell's marginal product of labor curve while robot hours are fixed at 9.

Output	Robot Hours	Labor Hours	$MP_L = \frac{\sqrt{K}}{3L^{2/3}}$
	9	8	
	9	27	
	9	64	
	9	125	

Answer:

Output	Robot Hours	Labor Hours	$MP_L = \frac{\sqrt{K}}{3L^{2/3}}$
6	9	8	0.25
9	9	27	0.11
12	9	64	0.063
15	9	125	0.04

A sketch of the marginal product of labor is

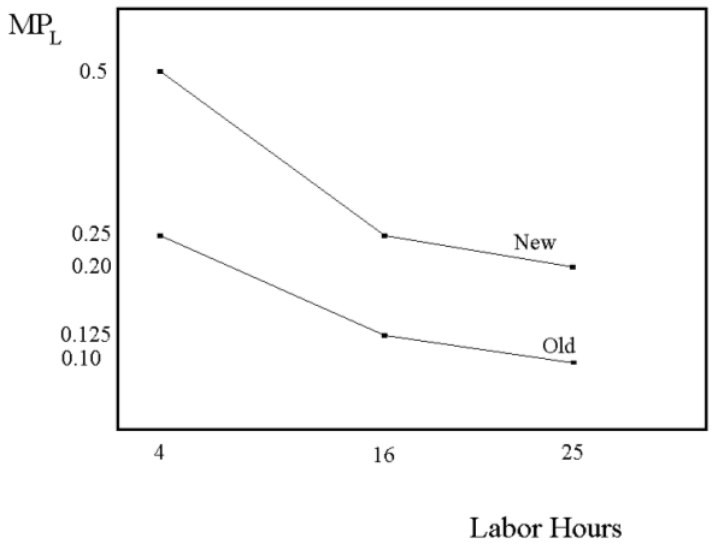


Diff: 2
Section: 6.2

100) Tad's Baitshop currently uses no computers in determining inventory. The number of items that can be inventoried in a day is given by $y(L) = \sqrt{L}$, where L is the number of labor hours used. If Tad purchases a computer to be used for inventory purposes, the number of items that can be inventoried in a day becomes $y(L) = 2\sqrt{L}$. Use the information in the table below to sketch Tad's marginal product of labor curves before and after the use of the computer for inventory purposes.

Old Quantity Inventoried	New Quantity Inventoried	*L*	Old MP of labor	New MP of labor
2	4	4	0.25	0.5
4	8	16	0.125	0.25
5	10	25	0.10	0.20

Answer:



Diff: 1
Section: 6.2

101) Trisha's Fashion Boutique production function for dresses is $y(K, L) = K^{1/2}L^{1/3}$, where K is the number of sewing machines and L is the amount of labor hours employed. Trisha pays \$15 per labor hour and sells each dress for \$87.50. Also, Trisha currently has 4 sewing machines. Fill in the table below. How many units of labor will Trisha employ before the value of the marginal product of labor is less than the cost of a labor hour?

y	L	$MP_L = \frac{\sqrt{K}}{3L^{2/3}}$	\$87.50(MP_L)
	1		
	20		
	40		
	60		
	80		

Answer:

y	L	$MP_L = \frac{\sqrt{K}}{3L^{2/3}}$	\$87.50(MP_L)
2	1	0.666667	58.33333
5.428835	20	0.245602	21.49018
6.839904	40	0.194935	17.05677
7.829735	60	0.170291	14.90046
8.617739	80	0.15472	13.53797

As the above table illustrates, when Trisha moves from employing 40 labor hours to 60 labor hours, the value of the marginal product of labor falls under the marginal cost of labor at \$15.

Diff: 2
Section: 6.2

102) Sarah's Pretzel Plant produces pretzels according to the function $y(K, L) = 100\sqrt{K}\sqrt[3]{L}$. K is the number of ovens, and L is the number of labor hours Sarah uses to produce her pretzels. At the moment, Sarah uses 9 ovens. Also, she plans to hire 64 labor hours. Sarah can sell each unit of pretzels produced for \$3.50. Fill in the table below. If Sarah increased her use of labor hours to 65, would the value of the marginal product of labor exceed the wage rate of \$8.50?

$y(9, L)$	L	$MP_L = \frac{100}{L\ 2/3}$	\$3.50 * MP_L
	64		
	65		

Answer:

$y(9, L)$	L	$MP_L = \frac{100}{L\ 2/3}$	\$3.50 * MP_L
1,200	64	6.25	\$21.88
1,206.22	65	6.19	\$21.66

If Sarah uses 65 hours of labor, the value of the marginal product of the 65^{th} labor hour exceeds the \$8.50 cost of labor. This suggests that if Sarah goes beyond 64 units of labor hours, her profits will be higher.

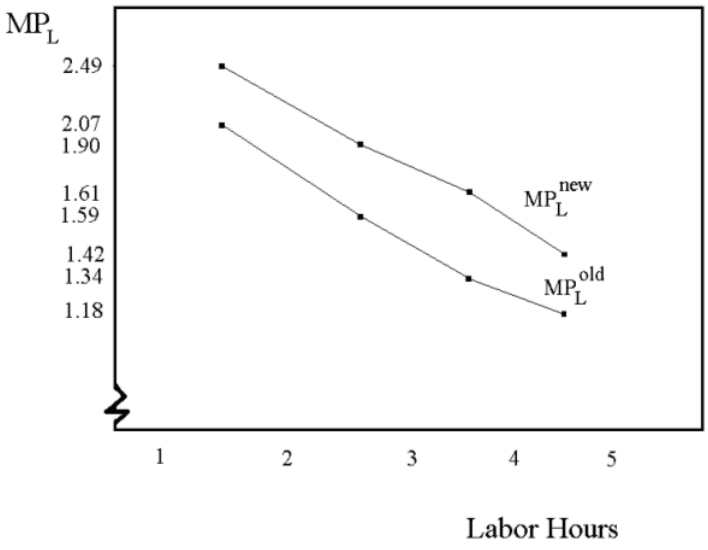
Diff: 2
Section: 6.2

103) Laura's Internet Services firm can design computer systems according to the function $y(K, L) = \sqrt[3]{K}\sqrt{L}$, where K is the amount of Gigabyte storage she has available and L is the amount of labor hours she employs. Currently, Laura has 125 gigabytes of storage. Sketch the change in the marginal product of labor curve for Laura's firm for values of L= 1, 2, 3, 4, and 5, if she increases her gigabyte storage capacity to 216.

Answer: We can approximate the change in the marginal product of labor as indicated in the following table. The marginal product of labor has increased when Laura added additional storage capacity.

L	$y(125, L) = 5\sqrt{L}$	MP_L	$y(216, L) = 6\sqrt{L}$	MP_L
1	5	2.07	6	2.49
2	7.07	1.59	8.49	1.90
3	8.66	1.34	10.39	1.61
4	10	1.18	12	1.42
5	11.18		13.42	

A sketch of the marginal product of labor is



Diff: 2
Section: 6.2

104) You are given the following table for a production process which has two variable outputs.

Capital Investment	Labor Input 1	2	3	4	5
1	35	60	70	85	95
2	60	70	85	95	105
3	70	85	95	105	115
4	85	95	105	115	125
5	95	105	115	125	135

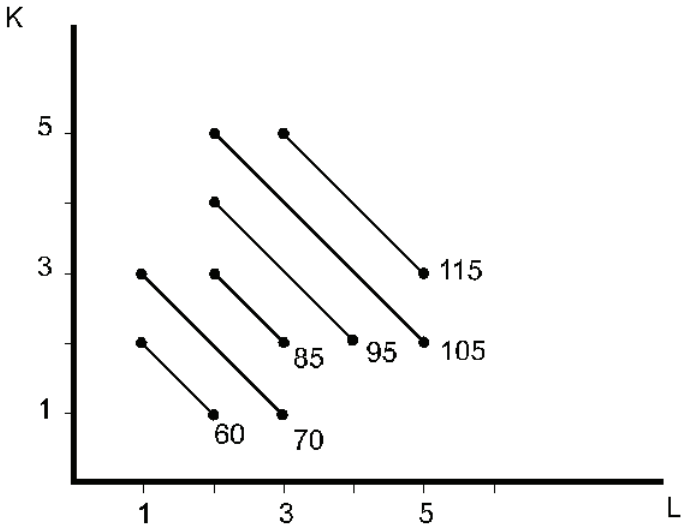
a. Sketch the isoquants corresponding to the following output levels: 60, 70, 85, 95, 105, and 115. What returns to scale does the production function exhibit? What can be said of the MRTS?

b. Analyze the marginal productivity of labor and capital for the production function.

Answer: ***a.***

It is possible to construct isoquants for the following rates of output: 60, 70, 85, 95, 105, and 115. Linear isoquants indicate that the MRTS is constant. Returns to scale can be determined by examining the main diagonal (i.e., 1L, 1K, 2L, 2K, etc). With move from 1L, 1K to 2L, 2K, output rises from 35 to 70, which is double. We conclude as we move from 1L, 1K to 2L, 2K, that there are constant returns to scale. As we move from 2L, 2K to 3L, 3K, input has been increased 1 1/2 times. Output rises from 70 to 95, a 1.36 proportional increase. From 2L, 2K to 3L, 3K, the production function exhibits decreasing returns to scale. It can be demonstrated that the function exhibits decreasing returns for the remaining input combinations.

b.



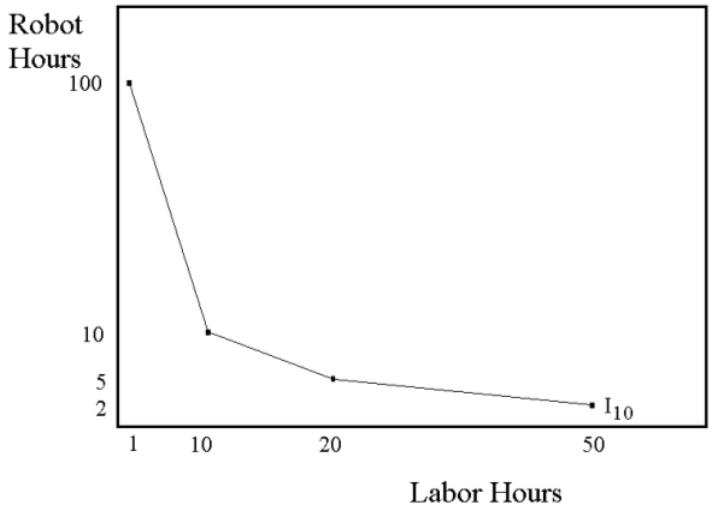
The production function exhibits decreasing marginal product of capital or labor initially and then constant marginal productivity from thereafter. This can be seen by holding one input constant and increasing the other input. For example, hold capital constant at three units. The MPs of labor are 70, 15, and then 10, 10, 10. Next, hold labor constant at four units. The MPs of capital are 85, 10, and 10, 10, 10.

Diff: 2
Section: 6.3

105) The production function for Spacely Sprockets is $y(K, L) = \sqrt{KL}$. K represents the number of robot hours used in the production process while L represents the number of labor hours. Using the information in the table below, sketch representative Isoquants for Spacely's production process.

output	*K*	*L*
10	100	1
10	10	10
10	5	20
10	2	50

Answer:



Diff: 1
Section: 6.3

106) Bridget's Brewery production function is given by $y(K, L) = 2\sqrt{KL}$, where K is the number of vats she uses and L is the number of labor hours. Does this production process exhibit increasing, constant or decreasing returns to scale? Holding the number of vats constant at 4, is the marginal product of labor increasing, constant or decreasing as more labor is used?

Answer: Since $y(1.1K, 1.1L) = 2\sqrt{(1.1K)(1.1L)} = 1.1\left(2\sqrt{KL}\right) = 1.1y(K, L)$, we know the production process exhibits constant returns to scale. Holding the number of vats constant at 4 will still result in a downward sloping marginal product of labor curve. That is the marginal product of labor decreases as more labor is used.

Diff: 2
Section: 6.4

107) Michael's Dairy farm production function is given by $y(K, L) = 2\sqrt{K}\sqrt[3]{L}$, where K is the number of machine milkers and L is the amount of labor hours he uses. Does this production function exhibit increasing, constant or decreasing returns to scale? Holding the number of machine milkers constant at 16, is the marginal product of labor increasing, constant or decreasing as more labor is used?

Answer: Since $y(1.1K, 1.1L) = 2\sqrt{(1.1K)}\sqrt[3]{(1.1L)} = (1.1)^{5/6}\left(2\sqrt{K}\sqrt[3]{L}\right) < (1.1)y(K, L)$, we know the production process exhibits decreasing returns to scale. Holding the number of machine milers constant at 16 will still result in a downward sloping marginal product of labor curve. That is, the marginal product of labor decreases as more labor is used.

Diff: 2
Section: 6.4

108) Leann's Telecommunication firm production function is given by $y(K, L) = 200(KL)^{2/3}$, where K is the number of internet servers and L is the number of labor hours she uses. Does this production function exhibit increasing, constant or decreasing returns to scale? Holding the number of internet servers constant at 8, is the marginal product of labor increasing, constant or decreasing as more labor is used?

Answer: Since $y(1.1K, 1.1L) = 200[(1.1K)(1.1L)]^{2/3} = (1.1)^{4/3}\left(200[KL]^{2/3}\right) > 1.1y(K, L)$, we know the production process exhibits increasing returns to scale. Holding the number of internet servers constant at 8 will still result in a downward sloping marginal product of labor curve. That is, the marginal product of labor decreases as more labor is used.

Diff: 2
Section: 6.4

109) Homer's boat manufacturing plant production function is $y(K, L) = \sqrt{K}\sqrt[5]{L}$ where K is the number of hydraulic lifts and L is the number of labor hours he employs. Does this production function exhibit increasing, decreasing or constant returns to scale? At the moment, Homer uses 20,000 labor hours and 50 hydraulic lifts. Suppose that Homer can use any amount of either input without affecting the market costs of the inputs. If Homer increased his use of labor hours and hydraulic lifts by 10%, how much would his production increase? Increasing the use of both inputs by 10% will result in Homer's costs increasing by exactly 10%. If Homer increases his use of all inputs by 10%, what will increase more, his production or his costs? Given that Homer can sell as many boats as he produces for $75,000, does his profits go up by 10% with a 10% increase in input use?

Answer: Since $y(1.1K, 1.1L) = \sqrt{(1.1K)}\sqrt[5]{(1.1L)} = (1.1)^{7/10}\left(\sqrt{K}\sqrt[5]{L}\right) < 1.1y(K, L)$, we know the production process exhibits decreasing returns to scale. Increasing input use by 10% will result in production increasing by less than 10%. According to the equation above, output would increase by about 6.9%. Since Homer can sell as many boats as he likes for $75,000, we know that Homer's revenue increases by 6.9%. Since costs go up by a larger amount than revenue, Homer's profits will not increase by 10%. This can be shown as follows:

$\pi_{new} = (1.1)^{7/10}\, TR(L, K) - (1.1)TC(L, K) < (1.1)\{TR(L, K) - TC(L, K)\} = (1.1)\pi_{old}$.

Diff: 3
Section: 6.4

110) Marge's Hair Salon production function is $y(K, L) = \sqrt{KL}$ where K is the number of hair dryers and L is the number of labor hours she employs. Does this production function exhibit increasing, decreasing, or constant returns to scale? At the moment, Marge uses 16 labor hours and 16 hair dryers. Suppose that Marge can use any amount of either input without affecting the market costs of the inputs. If Marge increased her use of labor hours and hair dryers by 10%, how much would her production increase? Increasing the use of both inputs by 10% will result in Marge's costs increasing by exactly 10%. If Marge increases her use of all inputs by 10%, what will increase more, her production or her costs? Given that Marge earns $12.50 for each unit produced, do her profits go up or down when she increases her input use by 10%?

Answer: Since $y(1.1K, 1.1L) = \sqrt{(1.1K)(1.1L)} = (1.1)\left(\sqrt{KL}\right) = 1.1y(K, L)$, we know the production process exhibits constant returns to scale. Increasing input use by 10% will result in production increasing by 10%. According to the equation above, output would increase by 10%. Since Marge can sell as many units as she likes for $12.50, we know that Marge's revenue increase by 10%. Since costs go up by the same amount as revenue, Marge's profits go up by 10%.

$\pi_{new} = (1.1)\ TR(L, K) - (1.1)TC(L, K) = (1.1)\{TR(L, K) - TC(L, K)\} = (1.1)\pi_{old}$.

Diff: 2
Section: 6.4

111) Apu's Squishy production function is $y(K, L) = K\sqrt{L}$ where K is the number of squishy machines and L is the number of labor hours he employs. Does this production function exhibit increasing, decreasing or constant returns to scale? At the moment, Apu uses 2 squishy machines and 4 labor hours. Suppose that Apu can use any amount of either input without affecting the market costs of the inputs. If Apu increased his use of labor hours and squishy machines by 100%, how much would his production increase? Increasing the use of both inputs by 100% will result in Apu's costs increasing by exactly 100%. If Apu increases his use of all inputs by 100%, what will increase more his production or his costs? Given that Apu can sell as many squishies as he produces for $1.00, do his profits go up or down when he increases his input use by 100%?

Answer: Since $y(2K, 2L) = (2K)\sqrt{(2L)} = (2)^{2/3}\left(K\sqrt{L}\right) > 2y(K, L)$, we know the production process exhibits increasing returns to scale. Increasing input use by 100% will result in production increasing by more than 100%. Since Apu can sell as many units as he likes for $1.00, we know that Apu's revenue increases by more than 100%. Since costs go up by only 100%, Apu's profits go up by more than 100%. This can be shown as follows:

$\pi_{new} = (2)^{3/2}TR(L, K) - (2)TC(L, K) > (2)\{TR(L, K) - TC(L, K)\} = (2)\pi_{old}$.

Diff: 2
Section: 6.4

Chapter 7 The Cost of Production

1) Two small airlines provide shuttle service between Las Vegas and Reno. The services are alike in every respect except that Fly Right bought its airplane for $500,000, while Fly by Night rents its plane for $30,000 a year. If Fly Right were to go out of business, it would be able to rent its plane to another airline for $30,000. Which airline has the lower costs?
   A) Fly Right.
   B) Fly by Night.
   C) Neither, the costs are identical.
   D) Neither, Fly by Night has lower costs at small output levels and Fly Right has lower costs at high output levels.

   Answer: C
   Diff: 1
   Section: 7.1

2) In 1985, Alice paid $20,000 for an option to purchase ten acres of land. By paying the $20,000, she bought the right to buy the land for $100,000 in 1992. When she acquired the option in 1985, the land was worth $120,000. In 1992, it is worth $110,000. Should Alice exercise the option and pay $100,000 for the land?
   A) Yes.
   B) No.
   C) It depends on what the rate of inflation was between 1985 and 1992.
   D) It depends on what the rate of interest was.

   Answer: A
   Diff: 2
   Section: 7.1

3) Farmer Jones bought his farm for $75,000 in 1975. Today the farm is worth $500,000, and the interest rate is 10 percent. ABC Corporation has offered to buy the farm today for $500,000 and XYZ Corporation has offered to buy the farm for $530,000 one year from now. Farmer Jones could earn net profit of $15,000 (over and above all of his expenses) if he farms the land this year. What should he do?
   A) Sell to ABC Corporation.
   B) Farm the land for another year and sell to XYZ Corporation.
   C) Accept either offer as they are equivalent.
   D) Reject both offers.

   Answer: A
   Diff: 2
   Section: 7.1

4) Which of the following statements is true regarding the differences between economic and accounting costs?
   A) Accounting costs include all implicit and explicit costs.
   B) Economic costs include implied costs only.
   C) Accountants consider only implicit costs when calculating costs.
   D) Accounting costs include only explicit costs.

   Answer: D
   Diff: 1
   Section: 7.1

5) Constantine purchased 100 shares of IBM stock several years ago for $150 per share. The price of these shares has fallen to $55 per share. Constantine's investment strategy is "buy low, sell high." Therefore, he will not sell his IBM stock until the price rises above $150 per share. If he sells at a price lower than $150 per share he will have "bought high and sold low." Constantine's decision:
A) is correct and shows a solid command of the nature of opportunity cost.
B) is incorrect because the original price paid for the shares is a sunk cost and should have no bearing on whether the shares should be held or sold.
C) is incorrect because when the price of a stock falls, the law of demand states that he should buy more shares.
D) is incorrect because it treats the price of the shares as an explicit cost.

Answer: B
Diff: 2
Section: 7.1

6) In order for a taxicab to be operated in New York City, it must have a medallion on its hood. Medallions are expensive, but can be resold, and are therefore an example of
A) a fixed cost.
B) a variable cost.
C) an implicit cost.
D) an opportunity cost.
E) a sunk cost.

Answer: A
Diff: 1
Section: 7.1

7) Prospective sunk costs
A) are relevant to economic decision–making.
B) are considered as investment decisions.
C) rise as output rises.
D) do not occur when output equals zero.

Answer: A
Diff: 2
Section: 7.1

8) Which of the following statements demonstrates an understanding of the importance of sunk costs for decision making?
I. "Even though I hate my MBA classes, I can't quit because I've spent so much money on tuition."
II. "To break into the market for soap our firm needs to spend $10M on creating an image that is unique to our new product. When deciding whether to develop the new soap, we need to take this marketing cost into account."
A) I only
B) II only
C) Both I and II
D) Neither I nor II

Answer: B
Diff: 3
Section: 7.1

9) The difference between the economic and accounting costs of a firm are
A) the accountant's fees.
B) the corporate taxes on profits .
C) the opportunity costs of the factors of production that the firm owns.
D) the sunk costs incurred by the firm.
E) the explicit costs of the firm.

Answer: C
Diff: 2
Section: 7.1

10) Consider the following statements when answering this question.
I. Increases in the rate of income tax decrease the opportunity cost of attending college.
II. The introduction of distance learning, which enables students to watch lectures at home, decreases the opportunity cost of attending college.
A) I is true, and II is false.
B) I is false, and II is true.
C) I and II are both true.
D) I and II are both false.

Answer: C
Diff: 1
Section: 7.1

11) Which of the following statements correctly uses the concept of opportunity cost in decision making?
I. "Because my secretary's time has already been paid for, my cost of taking on an additional project is lower than it otherwise would be."
II. "Since NASA is running under budget this year, the cost of another space shuttle launch is lower than it otherwise would be."
A) I is true, and II is false.
B) I is false, and II is true.
C) I and II are both true.
D) I and II are both false.

Answer: D
Diff: 3
Section: 7.1

12) Fixed costs are fixed with respect to changes in
A) output.
B) capital expenditure.
C) wages.
D) time.

Answer: A
Diff: 1
Section: 7.1

13) Incremental cost is the same concept as _____ cost.
A) average
B) marginal
C) fixed
D) variable

Answer: B
Diff: 1
Section: 7.1

14) Which of the following costs always declines as output increases?
A) Average cost
B) Marginal cost
C) Fixed cost
D) Average fixed cost
E) Average variable cost

Answer: D
Diff: 1
Section: 7.1

15) The total cost (TC) of producing computer software diskettes (Q) is given as: TC = 200 + 5Q. What is the variable cost?
A) 200
B) 5Q
C) 5
D) 5 + (200/Q)
E) none of the above

Answer: B
Diff: 1
Section: 7.1

16) The total cost (TC) of producing computer software diskettes (Q) is given as: TC = 200 + 5Q. What is the fixed cost?
A) 200
B) 5Q
C) 5
D) 5 + (200/Q)
E) none of the above

Answer: A
Diff: 1
Section: 7.1

17) The total cost (TC) of producing computer software diskettes (Q) is given as: TC = 200 + 5Q. What is the marginal cost?
A) 200
B) 5Q
C) 5
D) 5 + (200/Q)
E) none of the above

Answer: C
Diff: 1
Section: 7.1

18) The total cost (TC) of producing computer software diskettes (Q) is given as: TC = 200 + 5Q. What is the average total cost?
A) 500
B) 5Q
C) 5
D) 5 + (200/Q)
E) none of the above

Answer: D
Diff: 1
Section: 7.1

19) The total cost (TC) of producing computer software diskettes (Q) is given as: TC = 200 + 5Q. What is the average fixed cost?
A) 500
B) 5Q
C) 5
D) 5 + (200/Q)
E) none of the above

Answer: E
Diff: 1
Section: 7.1

20) Carolyn knows average total cost and average variable cost for a given level of output. Which of the following costs can she not determine given this information?
A) total cost
B) average fixed cost
C) fixed cost
D) variable cost
E) Carolyn can determine all of the above costs given the information provided.

Answer: E
Diff: 2
Section: 7.1

Scenario 7.1:
The average total cost to produce 100 cookies is $0.25 per cookie. The marginal cost is constant at $0.10 for all cookies produced.

21) Refer to Scenario 7.1. The total cost to produce 100 cookies is
A) $0.10
B) $0.25
C) $25.00
D) $100.00
E) indeterminate

Answer: C
Diff: 1
Section: 7.1

22) Refer to Scenario 7.1. The total cost to produce 50 cookies is
A) $20
B) $25
C) $50
D) $60
E) indeterminate

Answer: A
Diff: 3
Section: 7.1

23) Refer to Scenario 7.1. For 100 cookies, the average total cost is
A) falling.
B) rising.
C) neither rising nor falling.
D) less than average fixed cost.

Answer: A
Diff: 2
Section: 7.1

24) Refer to Scenario 7.1. Which piece of information would NOT be helpful in calculating the marginal cost of the 75th unit of output?
A) The total cost of 75 units
B) The total cost of 74 units
C) The variable cost of 75 units
D) The variable cost of 74 units
E) The firm's fixed cost

Answer: E
Diff: 1
Section: 7.1

25) Jim left his previous job as a sales manager and started his own sales consulting business. He previously earned $70,000 per year, but he now pays himself $25,000 per year while he is building the new business. What is the economic cost of the time he contributes to the new business?
A) $25,000 per year
B) zero
C) $70,000 per year
D) $45,000 per year

Answer: D
Diff: 2
Section: 7.1

26) We typically think of labor as a variable cost, even in the very short run. However, some labor costs may be fixed. Which of the following items represents an example of a fixed labor cost?
A) An hourly employee
B) A temporary worker who is paid by the hour
C) A salaried manager who has a three–year employment contract
D) none of the above

Answer: C
Diff: 2
Section: 7.1

27) Use the following two statements to answer this question:
I. The average cost curve and the average variable cost curve reach their minima at the same level of output.
II. The average cost curve and the marginal cost curve reach their minima at the same level of output.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: D
Diff: 3
Section: 7.2

28) Use the following two statements to answer this question:
I. The average total cost of a given level of output is the slope of the line from the origin to the total cost curve at that level of output.
II. The marginal cost of a given level of output is the slope of the line that is tangent to the variable cost curve at that level of output.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 2
Section: 7.2

29) Use the following two statements to answer this question:
I. The average total cost of a given level of output is the slope of the line from the origin to the total cost curve at that level of output.
II The marginal cost of a given level of output is the slope of the line that is tangent to the total cost curve at that level of output.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 2
Section: 7.2

30) For any given level of output:
A) marginal cost must be greater than average cost.
B) average variable cost must be greater than average fixed cost.
C) average fixed cost must be greater than average variable cost.
D) fixed cost must be greater than variable cost.
E) None of the above is necessarily correct.

Answer: E
Diff: 3
Section: 7.2

31) In a short–run production process, the marginal cost is rising and the average variable cost is falling as output is increased. Thus,
A) average fixed cost is constant.
B) marginal cost is above average variable cost.
C) marginal cost is below average fixed cost.
D) marginal cost is below average variable cost.

Answer: D
Diff: 2
Section: 7.2

32) In a short–run production process, the marginal cost is rising and the average total cost is falling as output is increased. Thus, marginal cost is
A) below average total cost.
B) above average total cost.
C) between the average variable and average total cost curves.
D) below average fixed cost.

Answer: A
Diff: 2
Section: 7.2

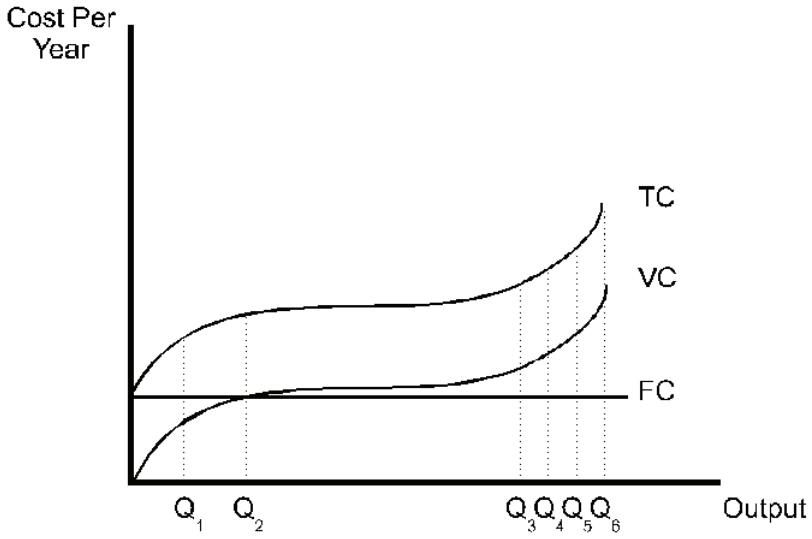


Figure 7.1

33) Which of the following relationships is NOT valid?
A) Rising marginal cost implies that average total cost is also rising.
B) When marginal cost is below average total cost, the latter is falling.
C) When marginal cost is above average variable cost, AVC is rising.
D) none of the above

Answer: A
Diff: 3
Section: 7.2

34) Refer to Figure 7.1. The diagram above contains _____ cost curves.
A) short run
B) intermediate run
C) long run
D) both short run and long run.

Answer: A
Diff: 1
Section: 7.2

35) Refer to Figure 7.1. At output level Q_1
A) marginal cost is falling.
B) average total cost is falling.
C) average variable cost is less than average fixed cost.
D) marginal cost is less than average total cost.
E) all of the above

Answer: E
Diff: 2
Section: 7.2

36) Refer to Figure 7.1. At output level Q_2
A) average fixed cost is increasing.
B) average variable cost equals average fixed cost.
C) marginal cost is negative.
D) average total cost is negative.
E) none of the above

Answer: B
Diff: 1
Section: 7.2

37) Refer to Figure 7.1. At output level Q_3
A) average fixed cost reaches its minimum.
B) average total cost reaches its minimum.
C) average variable cost reaches its minimum.
D) marginal cost reaches its minimum.
E) all of the above

Answer: C
Diff: 2
Section: 7.2

38) Refer to Figure 7.1. At what level of output does average total cost equal marginal cost?
A) Q_2
B) Q_3
C) Q_4
D) Q_5
E) none of the above

Answer: C
Diff: 2
Section: 7.2

39) Refer to Figure 7.1. At what level of output are average total cost, average cost, average fixed cost and marginal cost increasing?

A) Q_2
B) Q_3
C) Q_4
D) Q_5
E) none of the above

Answer: E
Diff: 2
Section: 7.2

40) Which always increase(s) as output increases?

A) Marginal Cost only
B) Fixed Cost only
C) Total Cost only
D) Variable Cost only
E) Total Cost and Variable Cost

Answer: E
Diff: 1
Section: 7.2

41) Consider the following statements when answering this question;

I. A firm's marginal cost curve does not depend on the level of fixed costs.
II. As output increases the difference between a firm's average total cost and average variable cost curves cannot rise.

A) I is true, and II is false.
B) I is false, and II is true.
C) I and II are both true.
D) I and II are both false.

Answer: C
Diff: 3
Section: 7.2

42) Consider the following statements when answering this question

I. If a firm employs only one variable factor of production, labor, and the marginal product of labor is constant, then the marginal costs of production are constant too.
II. If a firm employs only one variable factor of production, labor, and the marginal product of labor is constant, then short–run average total costs cannot rise as output rises.

A) I is true, and II is false.
B) I is false, and II is true.
C) I and II are both true.
D) I and II are both false.

Answer: C
Diff: 3
Section: 7.2

43) Consider the following statements when answering this question

I. If the marginal product of labor falls whenever more labor is used, and labor is the only factor of production used by the firm, than at every output level the firm's short–run average variable cost exceeds marginal cost.

II. If labor obeys the law of diminishing returns, and is the only factor of production used by the firm, then at every output level short–run average variable costs exceed marginal costs.

A) I is true, and II is false.
B) I is false, and II is true.
C) I and II are both true.
D) I and II are both false.

Answer: A
Diff: 3
Section: 7.2

44) Consider the following statements when answering this question

I. Whenever a firm's average variable costs are falling as output rises, marginal costs must be falling too.

II. Whenever a firm's average total costs are rising as output rises, average variable costs must be rising too.

A) I is true, and II is false.
B) I is false, and II is true.
C) I and II are both true.
D) I and II are both false.

Answer: B
Diff: 3
Section: 7.2

45) Consider the following statements when answering this question

I. The marginal cost curve intersects the average total cost and average variable cost curves at their minimum values.

II. When a firm has positive fixed costs, the output level associated with minimum average variable costs is less than the output associated with minimum average total costs.

A) I is true, and II is false.
B) I is false, and II is true.
C) I and II are both true.
D) I and II are both false.

Answer: C
Diff: 3
Section: 7.2

46) If a factory has a short–run capacity constraint (e.g., an auto plant can only produce 800 cars per day at maximum capacity), the marginal cost of production becomes _____ at the capacity constraint.

A) infinite
B) zero
C) highly elastic
D) less than the average variable cost

Answer: A
Diff: 2
Section: 7.2

47) In the short run, suppose average total cost is a straight line and marginal cost is positive and constant. Then, we know that fixed costs must:
A) be declining with output.
B) be positive.
C) equal zero.
D) We do not have enough information to answer this question.

Answer: C
Diff: 3
Section: 7.2

48) In the short run, suppose average total cost is a straight line and marginal cost is positive and constant. Then, we know that:
A) marginal cost is less than average total cost.
B) average total cost is positive and constant.
C) average total cost equals marginal cost.
D) A and B are correct.
E) B and C are correct.

Answer: E
Diff: 3
Section: 7.2

49) In the long run, which of the following is considered a variable cost?
A) Expenditures for wages
B) Expenditures for research and development
C) Expenditures for raw materials
D) Expenditures for capital machinery and equipment
E) all of the above

Answer: E
Diff: 1
Section: 7.3

50) An isocost line reveals the
A) costs of inputs needed to produce along an isoquant.
B) costs of inputs needed to produce along an expansion path.
C) input combinations that can be purchased with a given outlay of funds.
D) output combinations that can be produced with a given outlay of funds.

Answer: C
Diff: 1
Section: 7.3

51) Assume that a firm spends $500 on two inputs, labor (graphed on the horizontal axis) and capital (graphed on the vertical axis). If the wage rate is $20 per hour and the rental cost of capital is $25 per hour, the slope of the isocost curve will be
A) 500. B) 25/500. C) –4/5. D) 25/20 or 1.25.

Answer: C
Diff: 1
Section: 7.3

52) Which of the following is NOT an expression for the cost minimizing combination of inputs?
A) MRTS = MP_L /MP_K
B) $MP_L/w = MP_K/r$
C) MRTS = w/r
D) $MP_L/MP_K = w/r$
E) none of the above

Answer: A
Diff: 2
Section: 7.3

53) When an isocost line is just tangent to an isoquant, we know that
A) output is being produced at minimum cost.
B) output is not being produced at minimum cost.
C) the two products are being produced at the least input cost to the firm.
D) the two products are being produced at the highest input cost to the firm.

Answer: A
Diff: 1
Section: 7.3

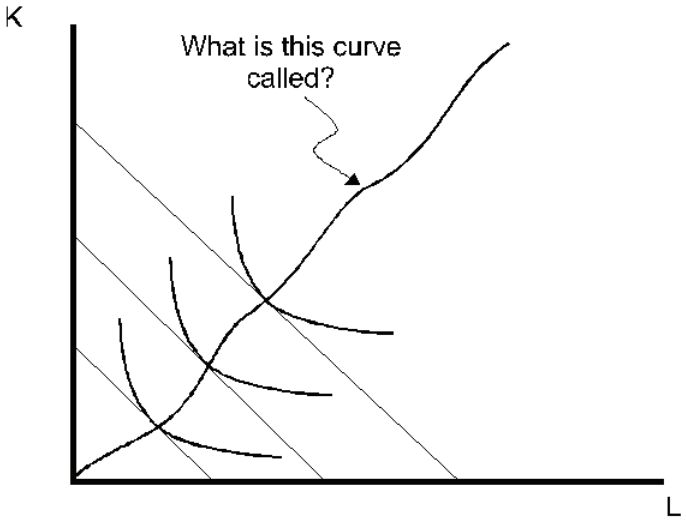
54) The total cost of producing a given level of output is
A) maximized when a corner solution exists.
B) minimized when the ratio of marginal product to input price is equal for all inputs.
C) minimized when the marginal products of all inputs are equal.
D) minimized when marginal product multiplied by input price is equal for all inputs.

Answer: B
Diff: 1
Section: 7.3

55) A firm's expansion path is
A) the firm's production function.
B) a curve that makes the marginal product of the last unit of each input equal for each output.
C) a curve that shows the least–cost combination of inputs needed to produce each level of output for given input prices.
D) none of the above

Answer: C
Diff: 1
Section: 7.3

56) The curve in the diagram is called



A) the income–consumption curve.
B) the long–run total cost curve.
C) the expansion path.
D) the price–consumption curve.
E) none of the above

Answer: C
Diff: 1
Section: 7.3

57) At the optimum combination of two inputs,
A) the slopes of the isoquant and isocost curves are equal.
B) costs are minimized for the production of a given output.
C) the marginal rate of technical substitution equals the ratio of input prices.
D) all of the above
E) A and C only

Answer: D
Diff: 2
Section: 7.3

58) Suppose that the price of labor (P_L) is \$10 and the price of capital (P_K) is \$20. What is the equation of the isocost line corresponding to a total cost of \$100?
A) $P_L + 20P_K$
B) $100 = 10L + 20K$
C) $100 = 30(L+K)$
D) $100 + 30\left(P_L + P_K\right)$
E) none of the above

Answer: B
Diff: 2
Section: 7.3

59) With its current levels of input use, a firm's MRTS is 3 (when capital is on the vertical axis and labor is on the horizontal axis). This implies
A) the firm could produce 3 more units of output if it increased its use of capital by one unit (holding labor constant).
B) the firm could produce 3 more units of output if it increased its use of labor by one unit (holding capital constant).
C) if the firm reduced its capital stock by one unit, it would have to hire 3 more workers to maintain its current level of output.
D) if it used one more unit of both capital and labor, the firm could produce 3 more units of output.
E) the marginal product of labor is 3 times the marginal product of capital.

Answer: E
Diff: 2
Section: 7.3

60) A firm employs 100 workers at a wage rate of $10 per hour, and 50 units of capital at a rate of $21 per hour. The marginal product of labor is 3, and the marginal product of capital is 5. The firm
A) is producing its current output level at the minimum cost.
B) could reduce the cost of producing its current output level by employing more capital and less labor.
C) could reduce the cost of producing its current output level by employing more labor and less capital.
D) could increase its output at no extra cost by employing more capital and less labor.
E) Both B and D are true.

Answer: C
Diff: 2
Section: 7.3

61) An effluent fee is imposed on a steel firm to reduce the amount of waste materials that it dumps in a river. Use the following two statements to answer this question:
I. The more easily factors of production can be substituted for one another (for example, capital can be used to reduce waste water), the more effective the fee will be in reducing effluent.
II. The greater the degree of substitution of capital for waste water, the less the firm will have to pay in effluent fees.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 2
Section: 7.3

62) A firm wants to minimize the total cost of producing 100 tons of dynamite. The firm uses two factors of production, chemicals and labor. The combination of chemicals and labor that minimizes production costs will be found where
A) the marginal products of chemicals and labor are equal
B) the ratio of the amount of chemicals used to the amount of labor used equals the ratio of the marginal product of chemicals to the marginal product of labor
C) the ratio of the amount of chemicals used to the amount of labor used equals the ratio of the price of chemicals to the wage rate
D) the production of an additional unit of dynamite costs the same regardless of whether chemicals or labor are used
E) none of the above

Answer: D
Diff: 3
Section: 7.3

63) A plant uses machinery and waste water to produce steel. The owner of the plant wants to maintain an output of 10,000 tons a day, even though the government has just imposed a $100 per gallon tax on using waste water. The reduction in the amount of waste water that results from the imposition of this tax depends on
A) the amount of waste water used before the tax was imposed.
B) the cost to the firm of using waste water before the tax was put in place.
C) the rental rate of machinery.
D) the marginal product of waste water only.
E) the ratio of the marginal product of waste water to the marginal product of machinery.

Answer: E
Diff: 2
Section: 7.3

64) Consider the following statements when answering this question.
I. With convex isoquants, a firm's expansion path cannot be negatively sloped.
II. If a firm uses only two factors of production, one of whose marginal product becomes negative when its use exceeds a certain level, then a cost–minimizing firm's expansion path will have vertical or horizontal segments.
A) I is true, and II is false.
B) I is false, and II is true.
C) Both I and II are true.
D) Both I and II are false.

Answer: C
Diff: 3
Section: 7.3

65) Suppose our firm produces chartered business flights with capital (planes) and labor (pilots) in fixed proportion (i.e., one pilot for each plane). The expansion path for this business will:
A) increase at a decreasing rate because we will substitute capital for labor as the business grow.
B) follow the 45–degree line from the origin.
C) not be defined.
D) be a vertical line.

Answer: B
Diff: 2
Section: 7.3

66) Suppose our firm produces chartered business flights with capital (planes) and labor (pilots) in fixed proportion (i.e., one pilot for each plane). If the wage rate paid to the pilots increases relative to the rental rate of capital for the airplanes, then:
A) the optimal capital–labor ratio should increase.
B) the optimal capital–labor ratio should decrease.
C) the optimal capital–labor ratio remains the same.
D) We do not have enough information to answer this question.

Answer: B
Diff: 2
Section: 7.3

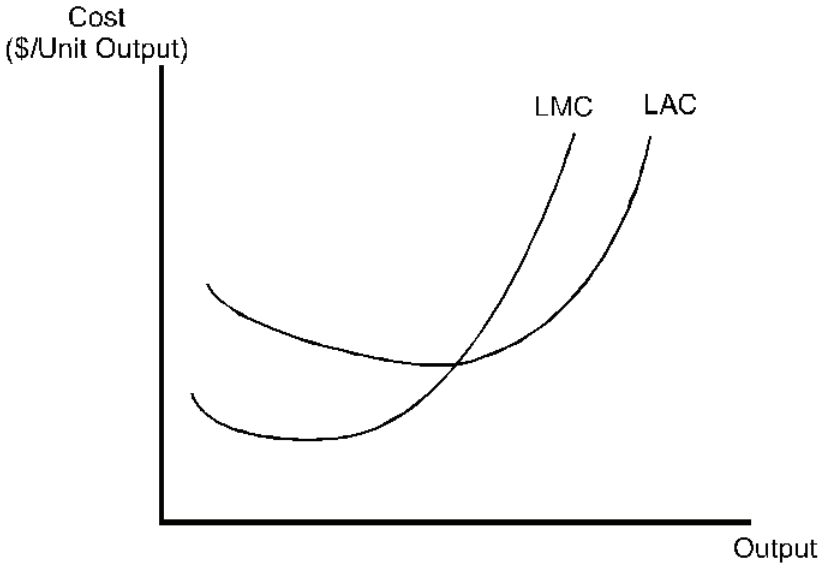
67) Assume that a firm's production process is subject to increasing returns to scale over a broad range of outputs. Long–run average costs over this output will tend to
A) increase.
B) decline.
C) remain constant.
D) fall to a minimum and then rise.

Answer: B
Diff: 1
Section: 7.4

68) A firm's short–run average cost curve is U–shaped. Which of these conclusions can be reached regarding the firm's returns to scale?
A) The firm experiences increasing returns to scale.
B) The firm experiences increasing, constant, and decreasing returns in that order.
C) The firm experiences first decreasing, then increasing returns to scale.
D) The short–run average cost curve reveals nothing regarding returns to scale.

Answer: D
Diff: 2
Section: 7.4

69) The LAC and LMC curves in the diagram below are consistent with a production function that exhibits



A) decreasing returns to scale.
B) constant returns to scale.
C) increasing returns to scale.
D) increasing returns to scale for small levels of output, then constant returns to scale, and eventually decreasing returns to scale as output increases.
E) decreasing returns to scale for small levels of output, then constant returns to scale, and eventually increasing returns to scale as output increases.

Answer: D
Diff: 2
Section: 7.4

70) The cost–output elasticity equals 1.4. This implies that:
A) there are neither economies nor diseconomies of scale.
B) there are economies of scale.
C) there are diseconomies of scale.
D) marginal cost is less than average cost.

Answer: C
Diff: 2
Section: 7.4

71) The cost–output elasticity is used to measure:
A) economies of scope.
B) economies of scale.
C) the curvature in the fixed cost curve.
D) steepness of the production function.

Answer: B
Diff: 2
Section: 7.4

72) Use the following two statements to answer this question:
I. Increasing returns to scale cause economies of scale.
II. Economies of scale cause increasing returns to scale.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: B
Diff: 3
Section: 7.4

73) At the current level of output, long–run marginal cost is $50 and long–run average cost is $75. This implies that:
A) there are neither economies nor diseconomies of scale.
B) there are economies of scale.
C) there are diseconomies of scale.
D) the cost–output elasticity is greater than one.

Answer: B
Diff: 3
Section: 7.4

74) The cost–output elasticity is used to measure
A) input substitution flexibility.
B) the slope of the firm's expansion path.
C) the slope of long–run average cost.
D) the slope of long–run marginal cost.
E) economies of scale.

Answer: E
Diff: 1
Section: 7.4

75) The cost–output elasticity can be written and calculated as
A) MC/AC.
B) AC/MC.
C) (AC)(MC).
D) $(AC)^2(MC)$.
E) $(AC)(MC)^2$.

Answer: A
Diff: 1
Section: 7.4

76) When there are economies of scale,
A) MC > AC, so cost–output elasticity is greater than AC.
B) MC < AC, so cost–output elasticity is less than AC.
C) MC < AC, so cost–output elasticity is greater than 1.
D) MC < AC, so cost–output elasticity is less than 1.
E) long–run marginal cost is declining.

Answer: D
Diff: 1
Section: 7.4

77) At every output level, a firm's short–run average cost (SAC) equals or exceeds its long–run average cost (LAC) because
A) diminishing returns apply in the short run.
B) returns to scale only exist in the long run.
C) opportunity costs are taken into account in the short run.
D) there are at least as many possibilities for substitution between factors of production in the long run as in the short run.
E) none of the above

Answer: D
Diff: 2
Section: 7.4

78) Consider the following statements when answering this question.
I. A technology with increasing returns to scale will generate a long–run average cost curve that has economies of scale.
II. Diminishing returns determines the slope of the short–run marginal cost curve, whereas returns to scale determine the slope of the long–run marginal cost curve.
A) I is true, and II is false.
B) I is false, and II is true.
C) Both I and II are true.
D) Both I and II are false.

Answer: C
Diff: 2
Section: 7.4

79) To model the input decisions for a production system, we plot labor on the horizontal axis and capital on the vertical axis. In the short run, labor is a variable input and capital is fixed. The short–run expansion path for this production system is:
A) a vertical line.
B) a horizontal line.
C) equal to the 45–degree line from the origin.
D) not defined.

Answer: B
Diff: 2
Section: 7.4

80) Use the following statements to answer this question:
I. The long–run average cost (LAC) curve is the envelope of the short–run average cost (SAC) curves.
II. The long–run marginal cost (LMC) curve is the envelope of the short–run marginal cost (SMC) curves.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: B
Diff: 1
Section: 7.4

81) Which of the following situations is NOT possible?
A) SAC and LAC are both increasing for some output levels.
B) SAC is increasing but LAC is decreasing for some output levels.
C) SAC is decreasing but LAC is increasing for some output levels.
D) SAC and LAC are both decreasing for some output levels.
E) All of the above are possible.

Answer: E
Diff: 2
Section: 7.4

82) Generally, economies of scope are present when
A) economies of scale are present in the production of two or more goods.
B) economies of scale are constant in the joint production of two products.
C) joint output is less from a single firm than could be achieved from two different firms each producing a single product (assuming equivalent production inputs in both situations).
D) joint output is greater from a single firm producing two goods than could be achieved by two different firms each producing a single product (assuming equivalent production inputs in both situations).

Answer: D
Diff: 1
Section: 7.5

83) When a product transformation curve is bowed outward, there are _____ in production.
A) economies of scope
B) economies of scale
C) diseconomies of scope
D) diseconomies of scale
E) none of the above

Answer: A
Diff: 1
Section: 7.5

84) Economies of scope refer to
A) changes in technology.
B) the very long run.
C) multiproduct firms.
D) single product firms that utilize multiple plants.
E) short–run economies of scale.

Answer: C
Diff: 1
Section: 7.5

85) A firm produces leather handbags and leather shoes. If there are economies of scope, the product transformation curve between handbags and shoes will be
A) a straight line.
B) bowed outward (concave).
C) bowed inward (convex).
D) a rectangle.

Answer: B
Diff: 1
Section: 7.5

86) Two firms, each producing different goods, can achieve a greater output than one firm producing both goods with the same inputs. We can conclude that the production process involves

A) diseconomies of scope.
B) economies of scale.
C) decreasing returns to scale.
D) increasing returns to scale.

Answer: A
Diff: 1
Section: 7.5

87) When a product transformation curve for a firm is bowed inward, there are _____ in production.

A) economies of scope
B) economies of scale
C) diseconomies of scope
D) diseconomies of scale

Answer: C
Diff: 2
Section: 7.5

88) Which of the following is true regarding the relationship between returns to scale and economies of scope?

A) A firm experiencing economies of scope must also experience increasing returns to scale.
B) Economies of scale and economies of scope must occur together.
C) A firm experiencing increasing returns to scale must also experience economies of scope.
D) There is no definite relationship between returns to scale and economies of scope.

Answer: D
Diff: 2
Section: 7.5

89) The equation below gives the degree of economies of scope (SC):

$$SC = (C(Q_1) + C(Q_2) - C(Q_1,Q_2)) / C(Q_1,Q_2)$$

where $C(Q_1)$ is the cost of producing output Q_1, $C(Q_2)$ is the cost of producing output Q_2, and $C(Q_1,Q_2)$ is the joint cost of producing both outputs. If SC is negative:

A) there are neither economies nor diseconomies of scope.
B) there are economies of scope.
C) there are diseconomies of scope.
D) there are both economies and diseconomies of scope.

Answer: C
Diff: 3
Section: 7.5

90) Bubba Burgers has discovered there are economies of scope available to the restaurant. Which is most likely to be a response to this discovery?

A) Bubba adds more varied inputs to burger production.
B) Bubba expands burger production, focusing on that one good.
C) Bubba contracts burger production.
D) Bubba adds grilled chicken sandwiches to the menu.
E) Bubba cuts back on the diversity of the menu.

Answer: D
Diff: 2
Section: 7.5

91) Which of the following business combinations likely exhibit economies of scope?
A) Banking services for individuals and banking services for other business
B) Retail clothing stores and electronic (internet) clothing sales
C) Hospitals that perform heart surgery and hospitals that perform cosmetic surgery
D) all of the above

Answer: D
Diff: 2
Section: 7.5

92) For a given pair of production outputs, the degree of economies of scope:
A) is constant across different output levels.
B) only increases as the level of output increases.
C) may increase or decrease with output.
D) will always tend to zero as output becomes very large.

Answer: C
Diff: 3
Section: 7.5

93) Which of the following is NOT a reason for average costs to fall according to the learning curve?
A) Workers accomplish tasks more quickly after doing the task a few times.
B) Managers schedule more efficiently over time.
C) Engineers determine more accurately what tolerances can be used.
D) Suppliers may become better able to produce the exact inputs the firm needs.
E) Competing firms leave the industry as the learning firm becomes more efficient.

Answer: E
Diff: 2
Section: 7.6

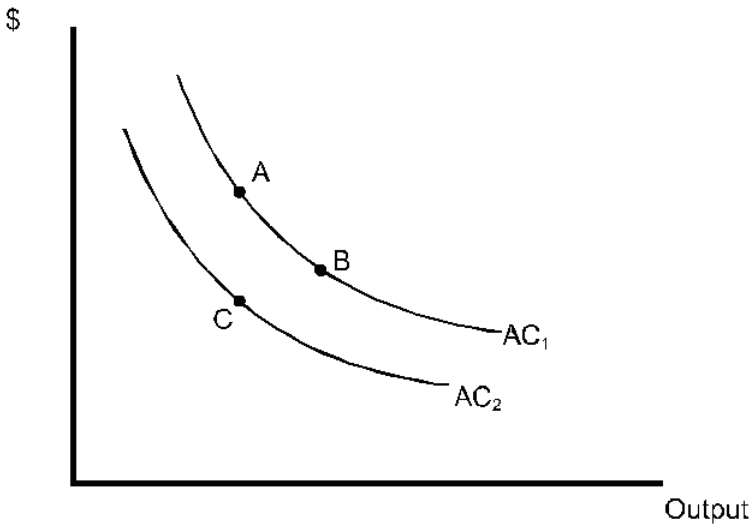


Figure 7.2

94) Refer to Figure 7.2. A movement from A to B in the figure represents
A) economies of scale.
B) diseconomies of scale.
C) learning.
D) economies of scope.
E) diseconomies of scope.

Answer: A
Diff: 1
Section: 7.6

95) A movement from A to C in Figure 7.2 may represent
A) economies of scale.
B) diseconomies of scale.
C) learning.
D) economies of scope.
E) diseconomies of scope.

Answer: C
Diff: 1
Section: 7.6

96) The presence of a learning curve may induce a decision maker in a startup firm to choose
A) low levels of output to exploit economies of scale.
B) high levels of output to exploit economies of scale.
C) low levels of output to shift the average cost curve down over time.
D) high levels of output to shift the average cost curve down over time.
E) to produce more than one output.

Answer: D
Diff: 2
Section: 7.6

97) Consider the following statements when answering this question.
I. Investment in new technology generates learning by doing.
II. Economies of scale cannot shift the long–run average cost curve down, whereas learning by doing can.
A) I is true, and II is false.
B) I is false, and II is true.
C) Both I and II are true.
D) Both I and II are false.

Answer: B
Diff: 2
Section: 7.6

98) Consider the following statements when answering this question.
I. As Boeing's production fell 10% to 100 planes last year, learning by doing cannot account for this year's changes in long–run average costs.
II. Failure to take into account the effects of learning by doing will lead to overestimates of the cost–output elasticity.
A) I is true, and II is false.
B) I is false, and II is true.
C) Both I and II are true.
D) Both I and II are false.

Answer: B
Diff: 3
Section: 7.6

99) A group of friends recently started manufacturing specialty T–shirts. The business has grown rapidly, with monthly production up from 50 to 250 in the first 6 months. During this same period, average production cost has been cut in half. The firm's long–run average cost curve over this range of output
A) is downward sloping.
B) is upward sloping.
C) is horizontal.
D) may be any of the above.

Answer: D
Diff: 2
Section: 7.6

100) Use the following two statements to answer this question:
I. A growing firm's average cost of production will decline over time if output continually expands and economies of scale are present.
II. A firm's average cost of production can decline over time if learning occurs as cumulative output increases.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 2
Section: 7.6

101) The learning curve is graphically represented as a plot of:
A) labor per unit on the horizontal axis and total cost on the vertical axis.
B) labor per unit on the horizontal axis and total number of units produced on the vertical axis.
C) total cost on the vertical axis and total number of units produced on the horizontal axis.
D) labor per unit on the vertical axis and total number of units produced on the horizontal axis.

Answer: D
Diff: 2
Section: 7.6

102) A learning curve may be expressed as a relationship between the labor per unit (L) and the total number of units produced (N). Which of the following learning curves exhibits a faster reduction in cost of production due to learning, (1) $L = 10 + N^{-1}$ or (2) $L = 10 + N^{-0.5}$?
A) Learning curve (1)
B) Learning curve (2)
C) Curves (1) and (2) exhibit the same rate.
D) We cannot determine the rate of cost reduction without knowing the value of N.

Answer: A
Diff: 2
Section: 7.6

103) A variable cost function of the form: $VC = 23 + Q + 7Q^2$ implies a marginal cost curve that is
A) linear.
B) downward sloping.
C) U–shaped.
D) quadratic.

Answer: A
Diff: 2
Section: 7.7

104) A cubic cost function implies:
A) a U–shaped average variable cost curve.
B) a U–shaped marginal cost curve.
C) a U–shaped average cost curve.
D) all of the above

Answer: D
Diff: 2
Section: 7.7

105) A variable cost function of the form: $VC = 52 + 2Q + 3Q^2$ implies a marginal cost curve that is
A) constant.
B) upward sloping.
C) U–shaped.
D) quadratic.

Answer: B
Diff: 2
Section: 7.7

106) A cubic cost function implies:
A) linear average fixed cost curve.
B) linear marginal cost curve.
C) a U–shaped average cost curve.
D) all of the above

Answer: C
Diff: 2
Section: 7.7

107) Which of the following is true of cost curves?
A) The ATC curve goes through the minimum of the MC curve.
B) The AVC curve goes through the minimum of the MC curve.
C) The MC curve goes through the minimum of the ATC curve, to the left of the minimum of the AVC curve.
D) The MC curve goes through the minimum of the AVC curve, to the right of the minimum of the ATC curve.
E) The MC curve goes through the minimum of both the AVC curve and the ATC curve.

Answer: E
Diff: 3
Section: 7.7

108) The scale economies index (SCI) is equal to:
A) the cost–output elasticity.
B) one minus the cost–output elasticity.
C) 100 times the degree of economies of scope (SC).
D) marginal cost divided by average cost.

Answer: B
Diff: 2
Section: 7.7

109) Use the following statements to answer this question:
I. The scale economies index is positive if the cost–output elasticity that is greater than one.
II. A negative scale economies index indicates the presence of diseconomies of scale.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are true.

Answer: C
Diff: 2
Section: 7.7

110) The key assumption required for us to use a linear variable cost function of the form VC = bq is that:
A) marginal cost must be constant and equal to b.
B) marginal cost must be increasing at rate b.
C) fixed costs must be zero.
D) marginal cost is always greater than average variable cost.

Answer: A
Diff: 2
Section: 7.7

111) A Cobb–Douglas production function:
A) exhibits constant returns to scale.
B) exhibits increasing returns to scale.
C) exhibits decreasing returns to scale.
D) can exhibit constant, increasing, or decreasing returns to scale.

Answer: D
Diff: 2
Section: Appendix

Scenario 7.2:
The production function for earthquake detectors (Q) is given as follows:

$Q = 4K^{1/2}L^{1/2}$

where K is the amount of capital employed and L is the amount of labor employed. The price of capital, P_K, is \$18 and the price of labor, P_L, is \$2.

112) Refer to Scenario 7.2. This production function is an example of which of the following types of production functions?
A) Cobb–Douglas
B) Leontief
C) Fixed proportions
D) Lagrange
E) none of the above

Answer: A
Diff: 1
Section: Appendix

113) Refer to Scenario 7.2. Suppose that you receive an order for 60 earthquake detectors. How much labor will you use to minimize the cost of 60 earthquake detectors?
A) 1
B) 5
C) 10
D) 45
E) none of the above

Answer: D
Diff: 3
Section: Appendix

114) Refer to Scenario 7.2. What is the marginal cost of the 60th earthquake detector?
A) 0
B) $5^{1/2}$
C) 3
D) 5
E) none of the above

Answer: C
Diff: 3
Section: Appendix

Scenario 7.3:
Use the production function: $Q = 4L^{1/2}K^{1/2}$.

115) The production function in Scenario 7.3 exhibits:
A) decreasing returns to scale.
B) constant returns to scale.
C) increasing returns to scale.
D) all of the above at various levels of output.

Answer: B
Diff: 1
Section: Appendix

116) The production function in Scenario 7.3 exhibits:
A) diminishing returns to labor.
B) diminishing returns to capital.
C) decreasing returns to scale.
D) all of the above
E) A and B, but not C.

Answer: E
Diff: 3
Section: Appendix

117) Refer to Scenario 7.3. Suppose that the price of labor is $5 and the price of capital is $20. Your firm desires to produce 200 units of output. How much labor will be hired to minimize the costs of producing 200 units of output?
A) 25
B) 50
C) 100
D) 200
E) none of the above

Answer: C
Diff: 3
Section: Appendix

118) Refer to Scenario 7.3. What is the total cost of producing 200 units of output?
A) 100
B) 1000
C) 1500
D) 2000
E) none of the above

Answer: B
Diff: 3
Section: Appendix

119) Refer to Scenario 7.3. When Q = 200, what is the marginal cost?
A) 0 B) 5 C) 10 D) 15 E) 25

Answer: B
Diff: 3
Section: Appendix

120) Refer to Scenario 7.3. Suppose that your firm decides to double its output to 400. To achieve this level of output the firm will have to:
A) exactly double its inputs.
B) more than double its inputs.
C) less than double its inputs.

Answer: A
Diff: 2
Section: Appendix

121) Refer to Scenario 7.3. Which of the following combinations of inputs is on the isoquant to produce 400 units of output?
A) L = 0, K = 400
B) L = 400, K = 0
C) L = 100, K = 100
D) all of the above
E) A and B, but not C

Answer: C
Diff: 2
Section: Appendix

122) When we solve the firm's cost minimization problem by the method of Lagrange multipliers, the optimal value of the Lagrange multiplier equals the:
A) marginal product of labor.
B) marginal product of capital.
C) marginal cost of production.
D) cost–output elasticity.

Answer: C
Diff: 1
Section: Appendix

123) When we solve the firm's dual production problem (i.e., maximize output subject to a cost constraint) by the method of Lagrange multipliers, the optimal value of the Lagrange multiplier equals the:
A) marginal product per unit cost of each variable input.
B) marginal product of capital.
C) marginal product of labor.
D) marginal cost of production.

Answer: A
Diff: 2
Section: Appendix

124) For the firm's cost minimization problem, one of the key assumptions for each input is that:
A) marginal product is constant.
B) marginal product is increasing at a decreasing rate.
C) marginal product is increasing at an increasing rate.
D) marginal product is decreasing at an increasing rate.

Answer: B
Diff: 1
Section: Appendix

125) Complete the following table:

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost
0	50			
1	60			
2	75			
3	100			
4	150			
5	225			
6	400			

Answer:

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost
0	50	0	50	–
1	60	10	50	10
2	75	25	50	15
3	100	50	50	25
4	150	100	50	50
5	225	175	50	75
6	400	350	50	175

Diff: 1
Section: 7.1

126) Complete the following table:

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost
0			60	
1		10		
2	90			
3				100
4		80		
5	180			
6				50

Answer:

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost
0	60	0	60	–
1	70	10	60	10
2	90	30	60	20
3	110	50	60	20
4	140	80	60	30
5	180	120	60	40
6	230	170	60	50

Diff: 2
Section: 7.1

127) Complete the following table (round each answer to the nearest whole number):

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost	Average Cost	Avg. Var. Cost	Avg. Fixed Cost
0	30						
1	35						
2	60						
3	110						
4	200						
5	320						
6	600						

Answer:

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost	Average Cost	Avg. Var. Cost	Avg. Fixed Cost
0	30	0	30	–	–	–	–
1	35	5	30	5	35	5	30
2	60	30	30	25	30	15	15
3	110	80	30	50	37	27	10
4	200	170	30	90	50	43	8
5	320	290	30	120	64	58	6
6	600	570	30	280	100	95	5

Diff: 1
Section: 7.1

128) Complete the following table (round each answer to the nearest whole number):

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost	Average Cost	Avg. Var. Cost	Avg. Fixed Cost
0							
1				5			
2					30		
3						13	
4	105						10
5		110					
6				50			

Answer:

Output	Total Cost	Variable Cost	Fixed Cost	Marginal Cost	Average Cost	Avg. Var. Cost	Avg. Fixed Cost
0	40	0	40	–	–	–	–
1	45	5	40	5	45	5	40
2	60	20	40	15	30	10	20
3	79	40	40	19	26	13	13
4	105	65	40	26	26	16	10
5	150	110	40	45	30	22	8
6	200	160	40	50	33	27	7

Diff: 2
Section: 7.1

129) Trisha believes the production of a dress requires 4 labor hours and 2 machine hours to produce. If Trisha decides to operate in the short run, she must spend $500 to lease her business space. Also, a labor hour costs $15 and a machine hour costs $35. What is Trisha's cost of production as a function of dresses produced?

Answer: Since the production of a dress requires spending $60 for labor and $70 for machine hours, Trisha's cost function is: $C(q) = 130q + 500$.

Diff: 2
Section: 7.2

130) A firm's total cost function is given by the equation:

$TC = 4000 + 5Q + 10Q^2$.

(1) Write an expression for each of the following cost concepts:

a. Total Fixed Cost
b. Average Fixed Cost
c. Total Variable Cost
d. Average Variable Cost
e. Average Total Cost
f. Marginal Cost

(2) Determine the quantity that minimizes average total cost. Demonstrate that the predicted relationship between marginal cost and average cost holds.

Answer: ***PART (1)***

a.

$$TFC = 4000$$

b.

$$AFC = \frac{4000}{Q}$$

c.

$$TVC = TC - TFC$$
$$TVC = 5Q + 10Q^2$$

d.

$$AVC = \frac{TVC}{Q} = \frac{5Q + 10Q^2}{Q} = 5 + 10Q$$

e.

$$ATC = \frac{TC}{Q} = \frac{4000 + 5Q + 10Q^2}{Q}$$

f.

$$MC = 5 + 20Q$$

PART (2)

ATC is minimized where MC is equal to ATC.

Equating MC to ATC

$$\frac{4000 + 5Q + 10Q^2}{Q} = 5 + 20Q$$
$$4000 + 5Q + 10^2 = 5Q + 20Q^2$$
$$4000 = 10Q^2$$
$$Q^2 = 400$$
$$Q = 20$$

ATC is minimized at 20 units of output. Up to 20, ATC falls, while beyond 20 ATC rises.

MC should be less than ATC for any quantity less than 20.
For example, let Q = 10:

$$MC = 5 + 20(10) = 205$$

$$ATC = \frac{4000 + 5(10) + 10(10)^2}{10} = 505$$

MC is indeed less than ATC for quantities smaller than 20.
MC should exceed ATC for any quantity greater than 20.
For example, let Q = 25:

$$MC = 5 + 20(25) = 505$$

$$ATC = \frac{4000 + 5(25) + 10(25)^2}{25} = 415$$

MC is indeed greater than ATC for quantities greater than 20.

Diff: 2
Section: 7.2

131) Acme Container Corporation produces egg cartons that are sold to egg distributors. Acme has estimated this production function for its egg carton division:

$$Q = 25L^{0.6}K^{0.4},$$

where Q = output measured in one thousand carton lots, L = labor measured in person hours, and K = capital measured in machine hours. Acme currently pays a wage of $10 per hour and considers the relevant rental price for capital to be $25 per hour. Determine the optimal capital–labor ratio that Acme should use in the egg carton division.

Answer: $MP_L = .6(25)L^{-0.4}K^{0.4} = 15\frac{K^{0.4}}{L^{0.4}}$

$$MP_K = .4(25)L^{0.6}K^{-0.6} = 10\frac{L^{0.6}}{K^{0.6}}$$

$$MRTS = \frac{MP_L}{MP_K}$$

$$MRTS = \frac{15\frac{K^{0.4}}{L^{0.4}}}{10\frac{L^{0.6}}{K^{0.6}}} = 1.5\frac{K^{0.4}}{L^{0.4}} \cdot \frac{K^{0.6}}{L^{0.6}}$$

$$MRTS = 1.5\frac{K}{L}$$

Equate MRTS to $\frac{w}{r}$.

$$1.5\frac{K}{L} = \frac{10}{25}$$

$$1.5\frac{K}{L} = 0.4$$

$1.5K = 0.4L$; $K=0.266L$

Diff: 2
Section: 7.3

132) A fast food restaurant currently pays $5 per hour for servers and $50 per hour to rent ovens and other kitchen machinery. The restaurant uses seven hours of server time per unit of machinery time. Determine whether the restaurant is minimizing its cost of production when the ratio of marginal products (capital to labor) is 12. If not, what adjustments are called for to improve the efficiency in resource use?

Answer: If the firm is minimizing its costs of production, then the MRTS will equal a ratio of prices of inputs.

The ratio of prices $\frac{P_K}{P_L} = \frac{50}{5} = 10$ and the MRTS of capital for labor $\frac{MP_K}{MP_L} = 12$.

Since these two ratios are not equal, the firm should change the mix of inputs. To increase efficiency in the use of inputs, the firm should use more capital and use less labor to make the ratios equal.

Diff: 2
Section: 7.3

133) Davy Metal Company produces brass fittings. Davy's engineers estimate the production function represented below as relevant for their long–run capital–labor decisions.

$$Q = 500L^{0.6}K^{0.8},$$

where Q = annual output measured in pounds,
L = labor measured in person hours,
K = capital measured in machine hours.
The marginal products of labor and capital are:

$$MP_L = 300L^{-0.4}K^{0.8} \qquad MP_K = 400L^{0.6}K^{-0.2}$$

Davy's employees are relatively highly skilled and earn $15 per hour. The firm estimates a rental charge of $50 per hour on capital. Davy forecasts annual costs of $500,000 per year, measured in real dollars.

a. Determine the firm's optimal capital–labor ratio, given the information above.
b. How much capital and labor should the firm employ, given the $500,000 budget? Calculate the firm's output.
c. Davy is currently negotiating with a newly organized union. The firm's personnel manager indicates that the wage may rise to $22.50 under the proposed union contract. Analyze the effect of the higher union wage on the optimal capital–labor ratio and the firm's employment of capital and labor. What will happen to the firm's output?

Answer: ***a.***

$$MP_L = 300L^{-0.4}K^{0.8} = 300\frac{K^{0.8}}{L^{0.4}}$$

$$MP_K = 400L^{0.6}K^{-0.2} = 400\frac{L^{0.6}}{K^{0.2}}$$

$$MRTS = \frac{300\dfrac{K^{0.8}}{L^{0.4}}}{400\dfrac{L^{0.6}}{K^{0.2}}} = 0.75\,\frac{K^{0.8}}{L^{0.4}}\frac{K^{0.2}}{L^{0.6}}$$

$$MRTS = 0.75\frac{K}{L}$$

Equate MRTS to $\frac{w}{r} = \frac{15}{50}$.

$$0.75\frac{K}{L} = \frac{15}{50}$$

$$0.75\frac{K}{L} = 0.3$$

$$\frac{K}{L} = 0.4;\ K=0.4L$$

b.

$$C = 500{,}000$$
$$C = wL + rK$$
$$500{,}000 = 15L + 50K$$

K = 0.4L from optimal ratio

$$500{,}000 = 15L + 50(0.4L)$$
$$500{,}000 = 15L + 20L$$
$$500{,}000 = 35L$$

L = 14,285.71 or 14,286 hours

Substitute to solve for K.

$500{,}000 = 15(14286) + 50K$

$500{,}000 = 214{,}290 + 50K$

$285{,}710 = 50K$

K = 5714.20

or K = 5714

$Q = 500(14{,}286)^{0.6}(5{,}714)^{0.8}$

$Q = 157{,}568{,}191$

c.

$$MRTS = 0.75\frac{K}{L}$$

$$\text{New } \frac{w}{r} = \frac{22.5}{50} = 0.45$$

Equating MRTS to $\frac{w}{r} = \frac{15}{50}$.

$$0.75\frac{K}{L} = 0.75$$

$$\frac{K}{L} = 0.6$$

$K = 0.6L$

Substitute into C:

$500{,}000 = 22.50L + 50K$

$K = 0.60L$

$500{,}000 = 22.50L + 50(0.6L)$

$500{,}000 = 22.50L + 30L$

$500{,}000 = 52.50L$

L = 9,523.8 or 9,524

L fell from 14,286 to 9,524. Substitute to solve for K.

$500{,}000 = 22.50(9{,}524) + 50K$

$285{,}710 = 50K$

K = 5,714.20 or 5,714

K remains constant.

$Q = 500(9524)^{0.6}(5714)^{0.8}$

Q = 123,541,771.8

Output fell from 157,568,202.5 to 123,541,771.8.

Diff: 3
Section: 7.3

134) The Longheel Press produces memo pads in its local shop. The company can rent its equipment and hire workers at competitive rates. Equipment needed for this operation can be rented at $52 per hour, and labor can be hired at $12 per worker hour. The company has allocated $150,000 for the initial run of memo pads. The production function using available technology can be expressed as:

$$Q = 0.25K^{0.25}L^{0.75},$$

where Q represents memo pads (boxes per hour), K denotes capital input (units per hour), and L denotes labor input (units of worker time per hour). The marginal products of labor and capital are as follows:

$$MP_L = (0.75)(0.25)K^{0.25}L^{-0.25}$$

$$MP_K = (0.25)(0.25)K^{-0.75}L^{0.75}$$

a. Construct the isocost equation.

b. Determine the appropriate input mix to get the greatest output for an outlay of $150,000 for a production run of memo pads. Also, compute the level of output.

c. Explain what would happen in the short run (keeping capital fixed) to the appropriate input mix if production were changed to 1,500 units per hour. Would the input combination be different in the long run? If so, how would it change? Explain.

Answer: ***a.*** $I = wL + rK$

$150{,}000 = 12L + 52K$

b. The appropriate input mix occurs where the

$$MP_L = (0.75)(0.25)K^{0.25}L^{-0.25}$$

$$MP_K = (0.25)(0.25)K^{-0.75}L^{0.75}$$

$$\frac{(0.75)(0.25)K^{0.25}L^{-0.25}}{(0.25)(0.25)K^{-0.75}L^{0.75}} = \frac{12}{52}$$

$$\frac{3K}{L} = \frac{3}{13} \qquad K = \frac{3L}{3 \cdot 13} = \frac{L}{13}$$

Thus, for each unit of K used, 13 units of labor are used. The total amount of labor used per time period is

$$150{,}000 = 12L + 52(L/13)$$
$$= 12L + 4L$$
$$= 16L$$
$$= 9{,}375$$

The amount of capital used per time period is

$$K = L/13 = 9375/13 = 721.15.$$

The output rate is

$$Q = 0.25(K^{0.25})(L^{0.25})$$
$$= 0.25(721.15)^{0.25}(9375)^{0.75}$$
$$= 0.25(5.182)(952.749)$$
$$= 1{,}234.29 \text{ boxes per hour.}$$

c.

If production were increased to 1,500 units per time period, it would have to be accomplished with more labor and not more capital, since capital is fixed. This level of production in the short run would be more expensive than producing this rate of output in the long run, because both labor and capital could be adjusted in the long run for the most efficient input combination.

Diff: 3
Section: 7.3

135) A paper company dumps nondegradable waste into a river that flows by the firm's plant. The firm estimates its production function to be:

$Q = 6KW,$

where Q = annual paper production measured in pounds, K = machine hours of capital, and W = gallons of polluted water dumped into the river per year. The marginal products of capital and labor are given as follows:

$MP_K = 6W \qquad MP_W = 6K$

The firm currently faces no environmental regulation in dumping waste into the river. Without regulation, it costs the firm $7.50 per gallon dumped. The firm estimates a $30 per hour rental rate on capital. The operating budget for capital and waste water is $300,000 per year.

a. Determine the firm's optimal ratio of waste water to capital.
b. Given the firm's $300,000 budget, how much capital and waste water should the firm employ? How much output will the firm produce?
c. The state environmental protection agency plans to impose a $7.50 effluent fee for each gallon that is dumped. Assuming that the firm intends to maintain its pre–fee output, how much capital and waste water should the firm employ? How much will the firm pay in effluent fees? What happens to the firm's cost as a result of the effluent fee?

Answer: ***a.***

$$MP_W = 6K$$
$$MP_K = 6W$$
$$MRTS = \frac{6K}{6W} = \frac{K}{W}$$

Rate of water charge to price of capital:

$$\frac{P_W}{P_U} = \frac{7.5}{30} = .25$$

Equating MRTS to ratio of input prices

$$\frac{K}{W} = 0.25, \qquad K = 0.25W$$

b.

$$C = P_W W + P_K K$$
$$300{,}000 = 7.50W + 30K$$

recall $K = 0.25W$

$$300{,}000 = 7.5W + 30(0.25W)$$
$$300{,}000 = 7.5W + 7.5W$$
$$W = 20{,}000 \text{ gallons}$$
$$K = 0.25W$$
$$K = 0.25(20{,}000)$$
$$K = 5000$$
$$Q = 6(5000)(20{,}000)$$
$$Q = 600{,}000{,}000$$

c.

P_W becomes $15 (7.50 previous cost + effluent fees).
ratio of input price is

$$\frac{P_W}{P_K} = \frac{15}{30} = 0.5$$

$$MRTS = \frac{K}{W}$$

Hold Q constant at 600,000,000

$Q = 6KW$

$K = 0.5W$

$600{,}000{,}000 = 6(0.5W)(W)$

$600{,}000{,}000 = 3W^2$

$200{,}000{,}000 = W^2$

$W = 14{,}142.13$ or $W = 14{,}142$

$K = 0.5(14{,}142)$

$K = 7071$

Water usage falls from 20,000 to 14,142 while capital rises from 5000 to 7071.
Effluent fee is $7.5 \times 7071 = \$53{,}032.5$
Cost prior to effluent fee was \$300,000 (from isocost level)
Cost after effluent fee is

$C = P_W W + P_K K$

where $P_W = 15$ (including fee)

$P_K = 30$

$C = 15(14142) + 30(7071)$

$C = 212{,}130 + 213{,}130$

$C = \$424{,}260$

Cost rises from \$300,000 to \$424,260.

Diff: 3
Section: 7.3

136) One Guy's short–run cost function is: $C(q, K) = \frac{0.53125q^2}{K} + 0.25K$, where q is the number of pizzas produced and K is the number of ovens. Currently, One Guy's is leasing 4 ovens in the short run. Calculate the average cost of producing 10 pizzas. The manager of One Guy's is considering leasing 5 additional ovens. If One Guy's adds 5 more ovens, what is the average total cost of producing 10 pizzas?

Answer: With 4 ovens, the average cost per pizza is: $ATC(10, 4) = \frac{C(10, 4)}{10} = \frac{53.125/4 + 1}{10} = 1.43$.

If One Guy's leases an additional 5 ovens, the average cost per pizza is:

$ATC(10, 9) = \frac{C(10, 9)}{10} = \frac{53.125/9 + 2.25}{10} = 0.82$. Adding 5 ovens will decrease the average cost of producing 10 pizzas.

Diff: 2
Section: 7.4

137) Ronald's Outboard Motor Manufacturing plant has the following short–run cost function: $C(q, A, K) = \frac{1500q^2}{A^2K} + 500K$, where q is the number of motors produced, K is the number of machines leased, and A is a productivity factor of technology. Currently, A is 25 and Ronald uses 20 machines. Ronald is investigating a new production technique. If he adopts the new technique, the productivity factor will become 36. If Ronald adopts the new technique, what is his average total cost of manufacturing 140 motors? Did the increase in the productivity factor increase or decrease the average total cost of producing 140 motors?

Answer: Initially, Ronald's average total cost of producing 140 motors is: $ATC(140, 25, 20) = \frac{\left(\frac{1500(140)^2}{(25)^2\,20} + 500(20)\right)}{140} = 88.23$. With the new technique, Ronald's average total cost of producing 140 motors is: $ATC(140, 36, 20) = \frac{\left(\frac{1500(140)^2}{(36)^2\,20} + 500(20)\right)}{140} = 79.53$. The increase in the productivity factor associated with the new technique decreases the average total cost of producing 140 units by \$8.70 per unit.

Diff: 2
Section: 7.4

138) Cogswell Cogs short–run cost function is: $C(q, K) = \frac{12q^3}{K^{3/2}} + 15K$, where q is the number of cogs produced and K is the amount of robot hours used. Currently, Cogs uses 16 robot hours to produce 300 cogs. What happens to the average total cost of producing 300 cogs if Cogswell increases robot hours to 25?

Answer: Initially, Cogswell's average total cost is: $ATC(300, 16) = \frac{\left(\frac{12(300)^3}{(16)^{3/2}} + 15(16)\right)}{300} = 16{,}875.80$. If Cogswell increases the use of robot hours to 25, his average total cost is: $ATC(300, 25) = \frac{\left(\frac{12(300)^3}{(25)^{3/2}} + 15(25)\right)}{300} = 8{,}641.25$. Cogswell's average total cost of producing 300 cogs falls by 49% if he increases his use of robot hours.

Diff: 2
Section: 7.4

139) Homer's boat manufacturing plant leases 50 hydraulic lifts and produces 25 boats per period. Homer's short–run cost function is: $C(q, K) = 15\frac{q^5}{K^{5/2}} + 200K$, where q is the number of boats produced and K is the number of hydraulic lifts. Homer's long–run cost function is: $C_{LR}(q) = 173.5578q^{10/7}$. At Homer's current short–run plant size, calculate Homer's short–run average total cost of production. If Homer would lease 11 more hydraulic lifts in the short run, will his short–run average total cost of producing 25 boats increase or decrease? Does Homer's long–run cost function exhibit increasing, constant, or decreasing returns to scale?

Answer: At Homer's current short–run plant size, Homer's short–run average total cost of production is: $ATC(25, 50) = \frac{\left(\frac{15(25)^5}{(50)^{5/2}} + 200(50)\right)}{25} = 731.46$. If Homer leases an additional 11 hydraulic lifts, short–run average total costs become: $ATC(25, 61) = \frac{\left(\frac{15(25)^5}{(61)^{5/2}} + 200(61)\right)}{25} = 689.62$. We see that Homer's short–run average total costs decrease if he uses 11 additional hydraulic lifts. Homer's long–run average costs are: $AC_{LR}(q) = \frac{C_{LR}(q)}{q} = \frac{173.5578q^{10/7}}{q} = 173.5578q^{3/7}$. Since long–run average costs increase as output increases, Homer's production process has decreasing returns to scale.

Diff: 2
Section: 7.4

140) Marge's Hair Salon uses 15 hair dryers to produce 10 units of output per period. Marge's short–run cost function is: $C(q, K) = \frac{15q^2}{K} + 12K$, where q is the number of units produced and K is the number of hair dryers Marge leases. Marge's long–run cost function is: $C_{LR}(q) = 26.8q$. If Marge used 4 fewer hair dryers in the short–run, would short–run average total costs increase or decrease? Does Marge's long–run cost curve exhibit increasing, constant, or decreasing returns to scale?

Answer: Currently, Marge's short–run average costs are:

$SRATC(10, 15) = \frac{\left(\frac{15(10)^2}{15} + 12(15)\right)}{10} = 28.00$. If Marge uses 4 fewer hair dryers in the short run, her short–run average total costs become:

$SRATC(10, 11) = \frac{\left(\frac{15(10)^2}{11} + 12(11)\right)}{10} = 26.84$. If Marge uses 4 fewer dryers and produces 10 units, her short–run average total costs decrease. Marge's long–run average costs are:

$LRAC = \frac{C_{LR}(q)}{q} = \frac{26.8q}{q} = 26.8$. We see that Marge's long–run average costs are constant. This implies that Marge's cost curve exhibits constant returns to scale.

Diff: 2
Section: 7.4

141) Apu leases 2 squishy machines to produce 40 squishies in the short run. Apu's short–run cost function is: $C(q, K) = 0.85\frac{q^2}{K^2} + 0.5K$, where q is the number of squishies produced and K is the number of squishy machines used. Apu's long–run cost function is: $C_{LR}(q) = 1.13q^{2/3}$. If Apu decides to lease 7 squishy machines, what happens to Apu's short–run average total cost of producing 40 squishies? Does Apu's long–run cost function exhibit increasing, constant, or decreasing returns to scale?

Answer: With 2 squishy machines, Apu's short–run average total costs are:

$SRATC(40, 2) = \frac{\left(0.85\frac{(40)^2}{(2)^2} + 0.5(2)\right)}{40} = 8.525$. If Apu leases 7 squishy machines, his short–run average total costs become: $SRATC(40, 7) = \frac{\left(0.85\frac{(40)^2}{(7)^2} + 0.5(7)\right)}{40} = 0.78$.

Leasing 5 additional squishy machines lowers Apu's short–run average total cost by 91%. Apu's long–run average cost curve is: $\text{LRAC(q)} = \frac{1.13q^{2/3}}{q^{1/3}}$. Since Apu's long–run average costs decrease as output increases, Apu's cost curve exhibit increasing returns to scale.

Diff: 2
Section: 7.4

142) The cost of producing 600 small fiberglass sailboats per year, and the cost of producing sails and fittings necessary to make the boats seaworthy in a single plant, are together $780,000. If produced in separate plants, the boats would cost $540,000, and the sails and fittings would cost $180,000. From this information, what can be learned about (1) economies of scale and (2) economies of scope in the production of sailboats, sails, and fittings? Perform any necessary calculations and explain.

Answer: The above information says nothing about economies of scale. However, one can calculate the degree of economies of scope. Use equation (7.7).

$$SC = \frac{C(Q_1) + C(Q_2) - C(Q_1, Q_2)}{C(Q_1, Q_2)}$$

$$= \frac{540{,}000 + 180{,}000 - 780{,}000}{780{,}000}$$

$$= -0.077$$

SC is negative but close to zero, there are slight diseconomies of scope.

Diff: 2
Section: 7.5

143) Bridget's Brewery can jointly produce dry stout and sweet stout. The cost function for joint production is: $C_{D,\,S}(q_1, q_2) = 6q_1 + 8q_2 - 10q_1^{1/3}q_2^{1/3}$, where q_1 is the quantity of dry stout and q_2 is the quantity of sweet stout that Bridget produces. If the brewery produces dry stout alone, the firm's cost function is: $C_D(q_1) = 6q_1$. If the brewery produces sweet stout alone, the cost function is:
$C_S(q_2) = 8q_2$. Calculate Bridget's degree of economies of scope if she produces 27 units of dry stout and 64 units of sweet stout.

Answer: $SC = \dfrac{C_D(q_1) + C_S(q_2) - C_{DS}(q_1, q_2)}{C_{DS}(q_1, q_2)} = \dfrac{10(27)^{1/3}(64)^{1/3}}{6(27) + 8(64) - 10(27)^{1/3}(64)^{1/3}} = 0.18$. Since the measure is positive, Bridget enjoys economies of scope for dry and sweet stout production.

Diff: 2
Section: 7.5

144) Trisha's Fashion Boutique can jointly produce evening gowns and formal gowns. The joint cost curve is: $C_{E,\,F}(q_1, q_2) = 75q_1 + 125q_2 - 20q_1^{1/2}q_2^{1/2}$, where q_1 is the number of evening gowns and q_2 is the number of formal gowns Trisha produces. If Trisha produces evening gowns alone, the cost function is: $C_E(q_1) = 75q_1$. If Trisha produces formal gowns alone, the cost function is:
$C_F(q_2) = 125q_2$. Calculate Trisha's degree of economies of scope if she produces 25 evening gowns and 9 formal gowns.

Answer: $SC = \dfrac{C_E(q_1) + C_F(q_2) - C_{EF}(q_1, q_2)}{C_{EF}(q_1, q_2)} = \dfrac{20(25)^{1/2}(9)^{1/2}}{75(25) + 125(9) - 20(25)^{1/2}(9)^{1/2}} = \dfrac{1}{9}$. Since the measure is positive, Trisha enjoys economies of scope for evening and formal gown production.

Diff: 2
Section: 7.5

145) One Guy's Pizza jointly produces pizzas and calzones. The joint cost function is:

$C_{P,\,C}(q_1, q_2) = 4q_1 + 0.8q_2 - 1.5q_1^{1/5}q_2^{1/5}$, where q_1 is the number of pizzas and q_2 is the number of calzones One Guy's Pizza produces. If One Guy produces pizzas alone, the cost function is:
$C_P(q_1) = 4q_1$. If One Guy produces calzones alone, the cost function is: $C_C(q_2) = 0.8q_2$.
Calculate One Guy's degree of economies of scope if they produce 1,024 pizzas and 243 calzones.

Answer: $SC = \dfrac{C_P(q_1) + C_C(q_2) - C_{PC}(q_1, q_2)}{C_{PC}(q_1, q_2)} = \dfrac{150(1024)^{1/5}(243)^{1/5}}{4(1024) + 0.8(243) - 150(1024)^{1/5}(243)^{1/5}} = 0.72.$

Since the measure is positive, One Guy's Pizza enjoys economies of scope for pizza and calzone production.

Diff: 2
Section: 7.5

146) Cogswell Cogs can jointly produce cogs or rotors. The joint cost function is:

$C_{C,\,R}(q_1, q_2) = 35q_1 + 12q_2 + 100q_1^{1/3}q_2^{1/2}$, where q_1 is the number of cogs and q_2 is the number of rotors Cogswell produces. If Cogswell produces cogs alone, the cost function is:
$C_C(q_1) = 35q_1$. If Cogswell produces rotors alone, the cost function is: $C_R(q_2) = 12q_2$.
Calculate Cogswell's degree of economies of scope if he produces 64 cogs and 16 rotors.

Answer: $SC = \dfrac{C_C(q_1) + C_R(q_2) - C_{CR}(q_1, q_2)}{C_{CR}(q_1, q_2)} = \dfrac{-100(64)^{1/3}(16)^{1/2}}{35(64) + 12(16) + 100(64)^{1/3}(16)^{1/2}} = -0.40$. Since the measure is negative, Cogswell's joint production process exhibits diseconomies of scope for cog and rotor production.

Diff: 2
Section: 7.5

147) Estimates of the industry long–run average cost of producing a type of plastic hook were made in 1970 and again in 1985. Estimates of these relationships are presented as:

$LAC_{70} = 10 - 0.3Q + 0.05Q^2$

$LAC_{85} = 8 - 0.6Q + 0.04Q^2$,

where Q is output in hundreds of cases per day, and LAC is average cost in dollars per unit. Assume that costs are expressed in inflation adjusted or constant dollars. From the information available, can you learn anything about economies of scope, economies of scale, and a learning curve in this industry? Explain. Do these curves reveal anything about the state of technology in this industry? Explain.

Answer: Nothing can be learned about economies of scope, given that only one product is being produced. We can get some idea about technology by calculating the output rate that produces a minimum LAC. For the two points in time, the minimum LAC is calculated as follows:

For 1970:

$LAC'_{70} = -0.3 + 0.1Q = 0$

$Q = 3.0$ (in hundreds of cases)

For 1985:

$LAC'_{85} = -0.6 + 0.08Q = 0$

$Q = 7.5$ (in hundreds of cases)

The LAC_{70} at $Q = 3$ is $10 - 0.3(3) + 0.05(3)^2 = \$9.55$/case.

The LAC_{85} at $Q = 7.5$ is $8 - 0.6(7.5) + 0.04(7.5)^2 = \$5.75$/case.

We see that LAC is minimized at positive levels of Q in 1970 and in 1985. Also, we see that LAC is minimized at a higher level of output in 1985 than in 1970. Over time the rate of production in the industry that represented the optimum scale of plant increased. The fact that LAC decreased time for various levels of output (LAC_{70} vs. LAC_{85}) indicates that technology changed (improved) and/or that there was a learning process in progress (learning curve). The data given do not allow one to separate the two effects. Since both LAC functions have minimums, economies of scale are evident. Economies occur to Q = 3 (1970) and Q = 7.5 (1985).

Diff: 3
Section: 7.6

148) LeAnn's Telecommunication firm long–run cost curve is: $C(q) = 16\frac{q^{3/4}}{A^{3/8}}$, where q is the number of units produced and A is the time in months that LeAnn's manager has spent on the job. What happens to production costs as the manager gains more experience on the job? Is this experience–effect common in production processes?

Answer: Increases in A will reduce the average cost of production for any quantity. This implies that as the manager gains job experience, LeAnn's cost of production will decrease. Suppose that LeAnn is producing 16 units and the manager has 1 month experience. LeAnn's costs are:

$C(16) = 16\frac{(16)^{3/4}}{(1)^{3/8}} = 128$. If LeAnn's manager has 256 months of experience, LeAnn's costs are: $C(16) = 16\frac{(16)^{3/4}}{(256)^{3/8}} = 16$. This experience–effect of the manager is referred to in economics as a "learning–curve" effect. Many production processes exhibit a learning–curve effect. That is, more time spent performing an activity results in greater efficiency and smaller costs.

Diff: 2
Section: 7.6

149) Bridget's Brewery long–run cost function is: $C(q) = \frac{28q}{A^{1/2}}$, where q is the number of units produced and A is the years of experience of Bridget's Chief Brewer. If Bridget plans on brewing 200 units per period, how much will costs be reduced initially by hiring a brewer with 16 years of experience versus a brewer with 1 year of experience?

Answer: Bridget's costs of producing 200 units with a brewer with 1 year of experience are:

$C(200) = \frac{28(200)}{(1)^{1/2}} = \$5{,}600$. A brewer with 16 years of experience implies Bridget's costs of producing 200 units are: $C(200) = \frac{28(200)}{(16)^{1/2}} = \$1{,}400$. Costs are reduced by \$4,200 initially by hiring a more experienced brewer.

Diff: 2
Section: 7.6

150) Michael's dairy farm's cost function is $C(q) = \frac{72q^{6/5}}{A^{1/5}}$, where q is the amount of output and A is the average age of Michael's employees. Currently, the average age of Michael's employees is 32. Next year, Michael expects the average age of his employees to decrease by 3 years due to job turnover. What happens to Michael's cost of production if he is correct?

Answer: Presently, Michael's costs are: $C_0(q) = \frac{72q^{6/5}}{(32)^{1/5}}$. Costs next year will be given by:

$C_1(q) = \frac{72q^{6/5}}{(29)^{1/5}}$. Michael's change in costs will be:

$$\Delta C(q) = C_1(q) - C_0(q) = \frac{72q^{6/5}\left[(32)^{1/5} - (29)^{1/5}\right]}{(32)^{1/5}(29)^{1/5}} = 0.716q^{6/5}.$$

Diff: 2
Section: 7.6

151) Murray Manufacturing Company produces pantyhose. The firm's production function is given as:

$Q = 5LK,$

where Q = pairs of pantyhose, L = labor measured in person hours, and K = capital measured in machine hours. Murray's labor cost, including fringe benefits, is $20 per hour, while the firm uses $80 per hour as an implicit machine rental charge per hour. Murray's current budget is $64,000 per month to pay labor and capital.

a. Given the information above, determine Murray's optimal capital/labor ratio.
b. Using the Lagrangian technique, determine the quantities of labor and capital that will allow the firm to maximize output given their budgeted input expenditure. What is the firm's output?
c. Again using the Lagrangian technique, demonstrate the duality in production and cost theory.

Answer: ***a.***

optimal capital/labor ratio

$$\frac{MP_L}{MP_K} = \frac{w}{r}$$

$$MP_L = \frac{\partial Q}{\partial L} = 5K$$

$$MP_K = \frac{\partial Q}{\partial L} = 5L$$

$$\frac{MP_L}{MP_K} = \frac{5K}{5L} = \frac{K}{L}$$

Equating $\frac{MP_L}{MP_K} = \frac{w}{r}$:

$$\frac{K}{L} = \frac{20}{80}$$

$$K = \frac{1}{4}L$$

b.

Lagrangian is to maximize Q subject to cost constraint.

$\text{Max } Q = 5LK$

subject to

$64{,}000 = 20L + 80K$

Form the Lagrangian function

$G = 5LK + \lambda(64{,}000 - 20L - 80K)$

$G = 5LK + \lambda 64{,}000 - 20\lambda L - 80\lambda K$

First order conditions are:

$$(1)\ \frac{\partial G}{\partial L} = 5K - 20\lambda = 0$$

$$(2)\ \frac{\partial G}{\partial K} = 5L - 80\lambda = 0$$

$$(3)\ \frac{\partial G}{\partial \lambda} = 64{,}000 - 20L - 80K = 0$$

Solve (1) and (2) to eliminate λ.

$5K - 20\lambda = 0$

$$\underline{5L - 80\lambda = 0}$$

$$\Downarrow$$

$$20K - 80\lambda = 0$$
$$\underline{5L - 80\lambda = 0}$$
$$20K - 5L = 0$$

Solve with expression for $\frac{\partial G}{\partial \lambda}$.

$$64{,}000 - 20L - 80K = 0$$
$$-5L + 20K = 0$$

$$64{,}000 - 20L - 80K = 0$$
$$\underline{-20L + 80K = 0}$$
$$64{,}000 - 40L = 0$$
$$64{,}000 = 40L$$
$$L = 1600$$
$$-5L + 20K = 0$$
$$-5(1600) + 20K = 0$$
$$-8000 + 20K = 0$$
$$20K = 8000$$
$$K = 400$$

$L = 1600, K = 400$
$Q = 0.5(1600)(400)$
$Q = 3{,}200{,}000$

c.

To demonstrate duality one must show that cost minimization approach leads to same answer as maximizing quantity.

Minimize $C = 20L + 80K$
subject to
$3{,}200{,}000 = 5LK$

Form Lagrangian function:

$$G^* = 20L + 80K + \lambda(3{,}200{,}000 - 5LK)$$
$$G^* = 20L + 80K + \lambda 3{,}200{,}000 - 5\lambda LK$$

First Order Conditions are:

$$(1)\ \frac{\partial G^*}{\partial L} = 20 - 5\lambda K = 0$$

$$(2)\ \frac{\partial G^*}{\partial K} = 80 - 5\lambda L = 0$$

$$(3)\ \frac{\partial G}{\partial \lambda} = 3{,}200{,}000 - 5LK = 0$$

Solve 1 and 2 to eliminate l.

$$20 - 5\lambda K = 0$$
$$80 - 5\lambda K = 0$$

$$20 / K - 5\lambda = 0$$

$$\underline{80 / L - 5\lambda = 0}$$

$$20 / K - 80 / L = 0$$

Combine with 3 to solve for L and K.

$$20 / K - 80 / L = 0$$
$$3{,}200{,}000 - 5LK = 0$$

Multiply top equation by L^2K.

$$20L^2 - 80LK = 0$$
$$3{,}200{,}000 - 5LK = 0$$

$$20L^2 - 80LK = 0$$
$$\underline{51{,}200{,}000 - 80LK = 0}$$
$$20L^2 - 51{,}200{,}000 = 0$$

$$20L^2 - 51{,}200{,}000 = 0$$
$$20L^2 = 51{,}200{,}000$$
$$L^2 = 2{,}560{,}000$$
$$L = 1600$$

$$3{,}200{,}000 - 5(1600)K = 0$$
$$-8000K = -3{,}200{,}000$$
$$K = 400$$

We find the identical K and L as with output maximization approach.

Diff: 3
Section: 7.6

152) A production process using two inputs, labor and capital, can be written as:

$Q = 5LK \qquad MP_K = 5L \qquad MP_L = 5K$

where Q represents output per day (tons). The unit costs of inputs are \$150 for labor (L) and \$1,000 for capital (K). Determine the least cost combination of L and K when output is produced at the rate of 1,000 tons per day. Determine the required outlay for 1,000 tons per day.

Answer: The least cost combination of inputs occurs where the ratio of prices of inputs equals the marginal rate of technical substitution of one input for another.

The price ratio is $P_L/P_K = 150/1{,}000 = 0.15$.

Now find the combination of L and K that will make MRTS equal to 0.15.

$$MRTS = \frac{MP_L}{MP_K} = \frac{5K}{5L} = 0.15$$

$K = 0.15L$

The output rate is $1000 = Q$, thus

$1000 = 5LK = 5L(0.15L) = 0.75L^2$

$L = \sqrt{1{,}333.33} = 36.51$ units.

$K = 0.15(36.51) = 5.48$ units.

The total outlay needed to purchase inputs to satisfy this production rate is:

$I = P_L L + P_K K$

$I = 150(36.51) + 1{,}000(5.48)$

$= \$5{,}476.50 + 5{,}480$

$I = \$10{,}956.50$ total outlay per day.

Diff: 3
Section: 7.6

153) Duane breeds parrots for a living. He has discovered that the production function for parrot chicks (Q) is:

$$Q = K^{1/2}L^{1/2}$$

where K is capital (for example nest boxes, cages and the like) and L is parrot food. The marginal products of capital and labor are as follows:

$$MP_K = .5K^{-1/2}L^{1/2} \qquad MP_L = .5K^{1/2}L^{-1/2}$$

The price of K is \$8 and the price of L is \$2.

a. What type of production function is this?
b. Does this production function exhibit constant, increasing or decreasing returns to scale? Explain.
c. What is the average product of capital?
d. Does capital obey the "law of diminishing returns?" Explain.
e. Suppose that Duane wants 144 parrot chicks, how much K and L should be employed to minimize costs, and what is the cost of producing 144 parrot chicks?
f. Suppose that Duane is faced with the same problem as in (f) except that he has a fixed amount of K. In fact, K = 16. How much L should be employed to minimize costs, and what is the total cost?

Answer: ***a.***
Cobb–Douglas.

b.
This production function exhibits constant returns to scale because $\sigma + \beta = 1$.

c.

$$AP_K = \frac{Q}{K} = \frac{L^5}{K^5}$$

d.
Yes, capital obeys "the law of diminishing returns" because as K increases, MP_K decreases (K is in the denominator).

e.
This problem is solved using the method of Lagrange multipliers. The Lagrangian is:

$$\Phi = 8K + 2L + \lambda(K^{.5}L^{.5} - 144)$$

Differentiating with respect to K, L and λ yields:

$$\partial\Phi/\partial K = 8 + \lambda(.5L^{.5}/K^{.5})$$
$$\partial\Phi/\partial L = 2 + \lambda(.5K^{.5}/L^{.5})$$
$$\partial\Phi/\partial\lambda = K^{.5}L^{.5} - 144$$

Setting these derivatives equal to zero and solving for K, L and λ yields
K = 72, L = 288, and TC = 1,152.

f.
If K = 16, then $Q = 4L^{.5}$.
Thus, for Q = 144, L = 1,296 and TC = 2,720.

Diff: 3
Section: 7.6

Chapter 8 Profit Maximization and Competitive Supply

1) A price taker is
   A) a firm that accepts different prices from different customers.
   B) a consumer who accepts different prices from different firms.
   C) a perfectly competitive firm.
   D) a firm that cannot influence the market price.
   E) both C and D

   Answer: E
   Diff: 1
   Section: 8.1

2) Which of following is an example of a homogeneous product?
   A) Gasoline
   B) Copper
   C) Personal computers
   D) Winter parkas
   E) both A and B

   Answer: E
   Diff: 1
   Section: 8.1

3) Which of following is a key assumption of a perfectly competitive market?
   A) Firms can influence market price.
   B) Commodities have few sellers.
   C) It is difficult for new sellers to enter the market.
   D) Each seller has a very small share of the market.
   E) none of the above

   Answer: D
   Diff: 1
   Section: 8.1

4) Several years ago, Alcoa was effectively the sole seller of aluminum because the firm owned nearly all of the aluminum ore reserves in the world. This market was not perfectly competitive because this situation violated the:
   A) price–taking assumption.
   B) homogeneous product assumption.
   C) free entry assumption.
   D) A and B are correct.
   E) A and C are correct.

   Answer: E
   Diff: 2
   Section: 8.1

5) Use the following statements to answer this question:
I. Markets that have only a few sellers cannot be highly competitive.
II. Markets with many sellers are always perfectly competitive.
A) I and II are true. B) I is true and II is false.
C) II is true and I is false. D) I and II are false.

Answer: D
Diff: 1
Section: 8.1

6) Firms often use patent rights as a:
A) barrier to exit. B) barrier to entry.
C) way to achieve perfect competition. D) none of the above

Answer: A
Diff: 2
Section: 8.1

7) A few sellers may behave if they operate in a perfectly competitive market is the market demand is:
A) highly inelastic. B) very elastic.
C) unitary elastic. D) composed of many small buyers.

Answer: B
Diff: 2
Section: 8.1

8) If managers do not choose to maximize profit, but pursue some other goal such as revenue maximization or growth,
A) they are more likely to become takeover targets of profit–maximizing firms.
B) they are less likely to be replaced by stockholders.
C) they are less likely to be replaced by the board of directors.
D) they are more likely to have higher profit than if they had pursued that policy explicitly.
E) their companies are more likely to survive in the long run.

Answer: A
Diff: 1
Section: 8.2

9) Owners and managers
A) must be the same people.
B) may be different people with different goals, and in the long run firms that do best are those in which the managers are allowed to pursue their own independent goals.
C) may be different people with different goals, but in the long run firms that do best are those in which the managers pursue the goals of the owners.
D) may be different people with different but exactly complementary goals.
E) may be different people with the same goals.

Answer: C
Diff: 1
Section: 8.2

10) The textbook for your class was not produced in a perfectly competitive industry because
A) there are so few firms in the industry that market shares are not small, and firms' decisions have an impact on market price.
B) upper–division microeconomics texts are not all alike.
C) it is not costless to enter or exit the textbook industry.
D) of all of the above reasons.

Answer: D
Diff: 2
Section: 8.2

11) If any of the assumptions of perfect competition are violated,
A) supply–and–demand analysis cannot be used to study the industry.
B) graphs with flat demand curves cannot be used to study the firm.
C) graphs with downward–sloping demand curves cannot be used to study the firm.
D) there may still be enough competition in the industry to make the model of perfect competition usable.
E) one must use the monopoly model instead.

Answer: D
Diff: 2
Section: 8.2

12) The "perfect information" assumption of perfect competition includes all of the following except one. Which one?
A) Consumers know their preferences.
B) Consumers know their income levels.
C) Consumers know the prices available.
D) Consumers can anticipate price changes.
E) Firms know their costs, prices and technology.

Answer: D
Diff: 2
Section: 8.2

13) The authors note that the goal of maximizing the market value of the firm may be more appropriate than maximizing short–run profits because:
A) the market value of the firm is based on long–run profits.
B) managers will not focus on increasing short–run profits at the expense of long–run profits.
C) this would more closely align the interests of owners and managers.
D) all of the above

Answer: D
Diff: 2
Section: 8.2

14) An association of businesses that are jointly owned and operated by members for mutual benefit is a:
A) condominium. B) corporation. C) cooperative. D) joint tenancy.

Answer: C
Diff: 1
Section: 8.2

15) In many rural areas, electric generation and distribution utilities were initially set up as cooperatives in which the electricity customers were member–owners. Like most cooperatives, the objective of these firms was to:
A) maximize profits for the member–owners.
B) maximize total revenue that could be redistributed to the member–owners.
C) operate at zero profit in order to provide low electricity prices for the member–owners.
D) minimize the costs of production.

Answer: C
Diff: 2
Section: 8.2

16) Revenue is equal to
A) price times quantity.
B) price times quantity minus total cost.
C) price times quantity minus average cost.
D) price times quantity minus marginal cost.
E) expenditure on production of output.

Answer: A
Diff: 1
Section: 8.3

17) Marginal revenue, graphically, is
A) the slope of a line from the origin to a point on the total revenue curve.
B) the slope of a line from the origin to the end of the total revenue curve.
C) the slope of the total revenue curve at a given point.
D) the vertical intercept of a line tangent to the total revenue curve at a given point.
E) the horizontal intercept of a line tangent to the total revenue curve at a given point.

Answer: C
Diff: 1
Section: 8.3

18) A firm maximizes profit by operating at the level of output where
A) average revenue equals average cost.
B) average revenue equals average variable cost.
C) total costs are minimized.
D) marginal revenue equals marginal cost.
E) marginal revenue exceeds marginal cost by the greatest amount.

Answer: D
Diff: 1
Section: 8.3

19) At the profit–maximizing level of output, what is true of the total revenue (TR) and total cost (TC) curves?
A) They must intersect, with TC cutting TR from below.
B) They must intersect, with TC cutting TR from above.
C) They must be tangent to each other.
D) They cannot be tangent to each other.
E) They must have the same slope.

Answer: E
Diff: 1
Section: 8.3

20) When the TR and TC curves have the same slope,
A) they are the furthest from each other.
B) they are closest to each other.
C) they intersect each other.
D) profit is negative.
E) profit is zero.

Answer: A
Diff: 1
Section: 8.3

21) If current output is less than the profit–maximizing output, then the next unit produced
A) will decrease profit.
B) will increase cost more than it increases revenue.
C) will increase revenue more than it increases cost.
D) will increase revenue without increasing cost.
E) may or may not increase profit.

Answer: C
Diff: 1
Section: 8.3

22) If current output is less than the profit–maximizing output, which must be true?
A) Total revenue is less than total cost.
B) Average revenue is less than average cost.
C) Average revenue is greater than average cost.
D) Marginal revenue is less than marginal cost.
E) Marginal revenue is greater than marginal cost.

Answer: E
Diff: 1
Section: 8.3

23) Marginal profit is equal to
A) marginal revenue minus marginal cost.
B) marginal revenue plus marginal cost.
C) marginal cost minus marginal revenue.
D) marginal revenue times marginal cost.
E) marginal revenue divided by marginal cost.

Answer: A
Diff: 1
Section: 8.3

24) At the profit–maximizing level of output, marginal profit
A) is also maximized.
B) is zero.
C) is positive.
D) is increasing.
E) may be positive, negative or zero.

Answer: B
Diff: 1
Section: 8.3

25) The demand curve facing a perfectly competitive firm is
A) the same as the market demand curve.
B) downward–sloping and less flat than the market demand curve.
C) downward–sloping and more flat than the market demand curve.
D) perfectly horizontal.
E) perfectly vertical.

Answer: D
Diff: 1
Section: 8.3

26) The demand curve facing a perfectly competitive firm is
A) the same as its average revenue curve, but not the same as its marginal revenue curve.
B) the same as its average revenue curve and its marginal revenue curve.
C) the same as its marginal revenue curve, but not its average revenue curve.
D) not the same as either its marginal revenue curve or its average revenue curve.
E) not defined in terms of average or marginal revenue.

Answer: B
Diff: 1
Section: 8.3

27) The perfectly competitive firm's marginal revenue curve is
A) exactly the same as the marginal cost curve.
B) downward–sloping, at twice the (negative) slope of the market demand curve.
C) vertical.
D) horizontal.
E) upward–sloping.

Answer: D
Diff: 1
Section: 8.3

28) Because of the relationship between a perfectly competitive firm's demand curve and its marginal revenue curve, the profit maximization condition for the firm can be written as
A) P = MR.
B) P = AVC.
C) AR = MR.
D) P = MC.
E) P = AC.

Answer: D
Diff: 1
Section: 8.3

29) The amount of output that a firm decides to sell has no effect on the market price in a competitive industry because
A) the market price is determined (through regulation) by the government
B) the firm supplies a different good than its rivals
C) the firm's output is a small fraction of the entire industry's output
D) the short run market price is determined solely by the firm's technology
E) the demand curve for the industry's output is downward sloping

Answer: C
Diff: 1
Section: 8.3

30) If the market price for a competitive firm's output doubles then
A) the profit maximizing output will double
B) the marginal revenue doubles
C) at the new profit maximizing output, price has increased more than marginal cost
D) at the new profit maximizing output, price has risen more than marginal revenue
E) competitive firms will earn an economic profit in the long–run.

Answer: B
Diff: 1
Section: 8.3

31) Marginal profit is negative when:
A) marginal revenue is negative.
B) total cost exceeds total revenue.
C) output exceeds the profit–maximizing level.
D) profit is negative.

Answer: C
Diff: 2
Section: 8.3

32) Suppose the state legislature in your state imposes a state licensing fee of $100 per year to be paid by all firms that file state tax revenue reports. This new business tax:
A) increases marginal cost.
B) decreases marginal cost.
C) increases marginal revenue.
D) decreases marginal revenue.
E) none of the above

Answer: E
Diff: 2
Section: 8.3

Consider the following diagram where a perfectly competitive firm faces a price of $40.

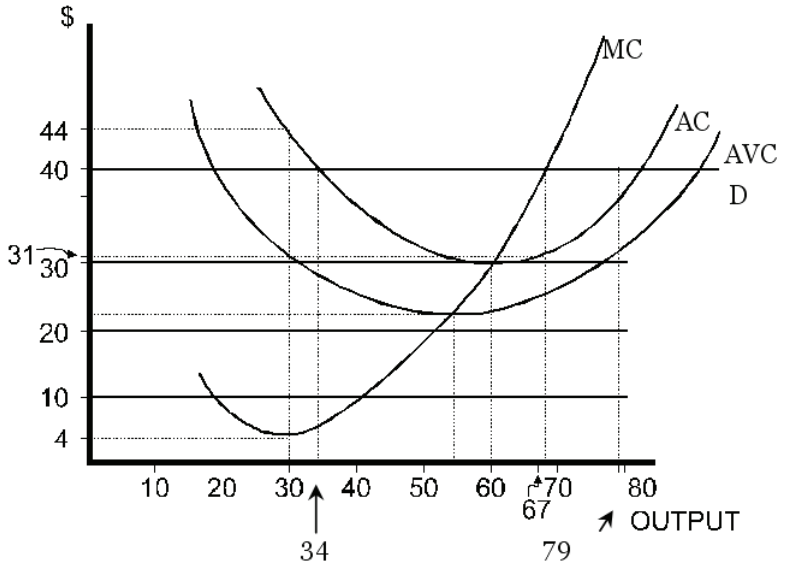


Figure 8.1

33) Refer to Figure 8.1. The profit–maximizing output is
A) 30. B) 54. C) 60. D) 67. E) 79.

Answer: D
Diff: 1
Section: 8.4

34) Refer to Figure 8.1. The firm earns zero profit at what output?
A) 0.
B) 34 and 79.
C) 54.
D) 60.
E) 67.

Answer: B
Diff: 1
Section: 8.4

35) Refer to Figure 8.1. At 67 units of output, profit is
A) maximized and zero.
B) maximized and negative.
C) maximized and positive.
D) not maximized, and zero.
E) not maximized, and negative.

Answer: C
Diff: 1
Section: 8.4

36) Refer to Figure 8.1. At the profit–maximizing level of output, ATC is
A) $26. B) $30. C) $31. D) $40. E) $44.

Answer: C
Diff: 1
Section: 8.4

37) Refer to Figure 8.1. At the profit–maximizing level of output, AVC is
A) $22. B) $26. C) $30. D) $32. E) $40.

Answer: B
Diff: 1
Section: 8.4

38) Refer to Figure 8.1. At the profit–maximizing level of output,
A) AVC is minimized.
B) ATC is minimized.
C) MC is minimized.
D) total cost is minimized.
E) no costs are minimized.

Answer: E
Diff: 1
Section: 8.4

39) Refer to Figure 8.1. At the profit–maximizing level of output, total revenue is
A) $1200. B) $2160. C) $2400. D) $2680. E) $3160.

Answer: D
Diff: 1
Section: 8.4

40) Refer to Figure 8.1. At the profit–maximizing level of output, total profit is
A) –$120. B) $0. C) $432. D) $600. E) $603.

Answer: E
Diff: 1
Section: 8.4

41) If a graph of a perfectly competitive firm shows that the MR = MC point occurs where MR is above AVC but below ATC,
A) the firm is earning negative profit, and will shut down rather than produce that level of output.
B) the firm is earning negative profit, but will continue to produce where MR = MC in the short run.
C) the firm is still earning positive profit, as long as variable costs are covered.
D) the firm is covering explicit, but not implicit, costs.
E) the firm can cover all of fixed costs but only a portion of variable costs.

Answer: B
Diff: 2
Section: 8.4

42) Bette's Breakfast, a perfectly competitive eatery, sells its "Breakfast Special" (the only item on the menu) for $5.00. The costs of waiters, cooks, power, food etc. average out to $3.95 per meal; the costs of the lease, insurance and other such expenses average out to $1.25 per meal. Bette should

A) close her doors immediately.
B) continue producing in the short and long run.
C) continue producing in the short run, but plan to go out of business in the long run.
D) raise her prices above the perfectly competitive level.
E) lower her output.

Answer: C
Diff: 2
Section: 8.4

43) If price is between AVC and ATC, the best and most practical thing for a perfectly competitive firm to do is

A) raise prices.
B) lower prices to gain revenue from extra volume.
C) shut down immediately, but not liquidate the business.
D) shut down immediately and liquidate the business.
E) continue operating, but plan to go out of business.

Answer: E
Diff: 2
Section: 8.4

44) An improvement in technology would result in

A) upward shifts of MC and reductions in output.
B) upward shifts of MC and increases in output.
C) downward shifts of MC and reductions in output.
D) downward shifts of MC and increases in output.
E) increased quality of the good, but little change in MC.

Answer: D
Diff: 1
Section: 8.4

45) If a competitive firm has a U–shaped marginal cost curve then

A) the profit maximizing output will always generate positive economic profit.
B) the profit maximizing output will always generate positive producer surplus.
C) the profit maximizing output is found where MC = MR and MC is decreasing.
D) the profit maximizing output is found where MC = MR and MC is constant.
E) the profit maximizing output is found where MC = MR and MC is increasing.

Answer: E
Diff: 2
Section: 8.4

Table 8.1

Q	P	TR	MR	TC	MC
0	$30	$0	---	$15	---
1	$30	$30	$30	$25	$10
2	$30	$60	$30	$40	$15
3	$30	$90	$30	$60	$20
4	$30	$120	$30	$85	$25
5	$30	$150	$30	$115	$30
6	$30	$180	$30	$150	$35

46) Refer to Table 8.1. That the firm is perfectly competitive is evident from its
A) increasing marginal cost.
B) increasing total cost.
C) zero economic profits.
D) constant marginal revenue.
E) absence of marginal values at Q = 0.

Answer: D
Diff: 2
Section: 8.4

47) Refer to Table 8.1. The maximum profit available to the firm is
A) $20. B) $30. C) $35. D) $155. E) $180.

Answer: C
Diff: 1
Section: 8.4

48) Average cost for the firm in Table 8.1
A) cannot be determined from the information given.
B) is upward-sloping for all output values shown.
C) is constant for all output values shown.
D) is downward-sloping for all output values shown.
E) is U-shaped.

Answer: E
Diff: 1
Section: 8.4

49) That Table 8.1 shows a short-run situation is evident from
A) the linear marginal revenue function.
B) the constant price.
C) the increasing marginal cost.
D) the presence of positive costs at Q = 0.
E) the absence of marginal values at Q = 0.

Answer: D
Diff: 1
Section: 8.4

50) The total revenue graph consistent with Table 8.1 is
A) linear and upward–sloping.
B) linear and horizontal.
C) linear and vertical.
D) linear and downward–sloping.
E) concave downwards.

Answer: A
Diff: 1
Section: 8.4

51) In the short run, a perfectly competitive firm earning positive economic profit is
A) on the downward–sloping portion of its ATC.
B) at the minimum of its ATC.
C) on the upward–sloping portion of its ATC.
D) above its ATC.
E) below its ATC.

Answer: C
Diff: 1
Section: 8.4

52) If a competitive firm's marginal cost curve is U–shaped then
A) its short run supply curve is U–shaped too
B) its short run supply curve is the downward–sloping portion of the marginal cost curve
C) its short run supply curve is the upward–sloping portion of the marginal cost curve
D) its short run supply curve is the upward–sloping portion of the marginal cost curve that lies above the short run average variable cost curve
E) its short run supply curve is the upward–sloping portion of the marginal cost curve that lies above the short run average total cost curve

Answer: D
Diff: 2
Section: 8.4

53) In the short run, a perfectly competitive profit maximizing firm that has not shut down
A) is operating on the downward–sloping portion of its AVC curve.
B) is operating at the minimum of its AVC curve.
C) is operating on the upward–sloping portion of its AVC curve.
D) is not operating on its AVC curve.
E) can be at any point on its AVC curve.

Answer: C
Diff: 3
Section: 8.4

54) In the short run, a perfectly competitive firm earning negative economic profit is
A) on the downward–sloping portion of its ATC curve.
B) at the minimum of its ATC curve.
C) on the upward–sloping portion of its ATC curve.
D) above its ATC curve.

Answer: A
Diff: 3
Section: 8.4

55) In the short run, a perfectly competitive firm earning negative economic profit
A) is on the downward–sloping portion of its AVC.
B) is at the minimum of its AVC.
C) is on the upward–sloping portion of its AVC.
D) is not operating on its AVC.
E) can be at any point on its AVC.

Answer: C
Diff: 3
Section: 8.4

56) A firm never operates
A) at the minimum of its ATC curve.
B) at the minimum of its AVC curve.
C) on the downward–sloping portion of its ATC curve.
D) on the downward–sloping portion of its AVC curve.
E) on its long–run marginal cost curve.

Answer: D
Diff: 3
Section: 8.4

57) When the price faced by a competitive firm was $5, the firm produced nothing in the short run. However, when the price rose to $10, the firm produced 100 tons of output. From this we can infer that
A) the firm's marginal cost curve must be flat.
B) the firm's marginal costs of production never fall below $5.
C) the firm's average cost of production was less than $10.
D) the firm's total cost of producing 100 tons is less than $1000.
E) the minimum value of the firm's average variable cost lies between $5 and $10.

Answer: E
Diff: 3
Section: 8.4

58) An industry analyst observes that in response to a small increase in price, a competitive firm's output sometimes rises a little and sometimes a lot. The best explanation for this finding is that
A) the firm's marginal cost curve is random.
B) the firm's marginal cost curve has a very small positive slope.
C) the firm's marginal cost has a very large positive slope.
D) the firm's marginal cost curve is horizontal for some ranges of output and rises in steps.
E) the firm's marginal cost curve is downward sloping.

Answer: D
Diff: 3
Section: 8.4

Scenario 8.1:
Two soft–drink firms, Fizzle & Sizzle, operate on a river. Fizzle is farther upstream, and gets cleaner water, so its cost of purifying water for use in the soft drinks is lower than Sizzle's by $500,000 yearly.

59) According to Scenario 8.1, Fizzle and Sizzle
A) would be perfectly competitive if their purification costs were equal; otherwise, not.
B) would be perfectly competitive if it costs Fizzle $500,000 yearly to keep that land.
C) may or may not be perfect competitors, but their position on the river has nothing to do with it.
D) cannot be perfect competitors because they are not identical firms.

Answer: C
Diff: 2
Section: 8.4

60) Refer to the information in Scenario 8.1. If Fizzle and Sizzle sell the same output at the same price and are otherwise identical, Fizzle's profit will be
A) higher than Sizzle's by $500,000 yearly.
B) higher than Sizzle's by just less than $500,000 yearly.
C) zero in the long run, and Sizzle will be out of business.
D) the same as Sizzle's, because Fizzle must be assigned an implicit cost of $500,000 yearly for economic rent.
E) the same as Sizzle's, because Sizzle will move to a more advantageous location in order to compete.

Answer: D
Diff: 3
Section: 8.4

61) Suppose your firm has a U–shaped average variable cost curve and operates in a perfectly competitive market. If you produce where the product price (marginal revenue) equals average variable cost (on the upward sloping portion of the AVC curve), then your output will:
A) exceed the profit–maximizing level of output.
B) be smaller than the profit–maximizing level of output.
C) equal the profit–maximizing level of output.
D) generate zero economic profits.

Answer: A
Diff: 3
Section: 8.4

62) Use the following statements to answer this question:
I. The firm's decision to produce zero output when the price is less than the average variable cost of production is known as the shutdown rule.
II. The firm's supply decision is to generate zero output for all prices below the minimum AVC.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: A
Diff: 1
Section: 8.4

63) The supply curve for a competitive firm is
A) its entire MC curve.
B) the upward–sloping portion of its MC curve.
C) its MC curve above the minimum point of the AVC curve.
D) its MC curve above the minimum point of the ATC curve.
E) its MR curve.

Answer: C
Diff: 1
Section: 8.5

64) Higher input prices result in
A) upward shifts of MC and reductions in output.
B) upward shifts of MC and increases in output.
C) downward shifts of MC and reductions in output.
D) downward shifts of MC and increases in output.
E) increased demand for the good the input is used for.

Answer: A
Diff: 1
Section: 8.5

65) Suppose a technological innovation shifts the marginal cost curve downward. Which one of the following cost curves does NOT shift?
A) Firm's short–run supply curve
B) Average total cost curve
C) Average variable cost curve
D) Average fixed cost curve

Answer: D
Diff: 1
Section: 8.5

66) Short–run supply curves for perfectly competitive firms tend to be upward sloping because:
A) there is diminishing marginal product for one or more variable inputs.
B) marginal costs increase as output increases.
C) marginal fixed costs equal zero.
D) A and B are correct.
E) B and C are correct.

Answer: D
Diff: 2
Section: 8.5

67) Use the following statements to answer this question:
I. Under perfect competition, an upward shift in the marginal cost curve (perhaps due to a higher price for a variable input) also shifts the average variable cost curve upward.
II. Under perfect competition., an upward shift in the marginal cost curve (perhaps due to a higher price for a variable input) reduces firm output but may increase firm profits.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: B
Diff: 3
Section: 8.5

68) Producer surplus in a perfectly competitive industry is
A) the difference between profit at the profit–maximizing output and profit at the profit–minimizing output.
B) the difference between revenue and total cost.
C) the difference between revenue and variable cost.
D) the difference between revenue and fixed cost.
E) the same thing as revenue.

Answer: C
Diff: 1
Section: 8.6

69) The shutdown decision can be restated in terms of producer surplus by saying that a firm should produce in the short run as long as
A) revenue exceeds producer surplus.
B) producer surplus is positive.
C) producer surplus exceeds fixed cost.
D) producer surplus exceeds variable cost.
E) profit and producer surplus are equal.

Answer: B
Diff: 1
Section: 8.6

70) A firm's producer surplus equals its economic profit when
A) average variable costs are minimized.
B) average fixed costs are minimized.
C) marginal costs equal marginal revenue.
D) fixed costs are zero.
E) total revenues equal total variable costs.

Answer: D
Diff: 1
Section: 8.6

71) In a supply–and–demand graph, producer surplus can be pictured as the
A) vertical intercept of the supply curve.
B) area between the demand curve and the supply curve to the left of equilibrium output.
C) area under the supply curve to the left of equilibrium output.
D) area under the demand curve to the left of equilibrium output.
E) area between the equilibrium price line and the supply curve to the left of equilibrium output.

Answer: E
Diff: 2
Section: 8.6

72) If a competitive firm's marginal costs always increase with output, then at the profit maximizing output level, producer surplus is
A) zero because marginal costs equal marginal revenue.
B) zero because price equals marginal costs.
C) positive because price exceeds average variable costs.
D) positive because price exceeds average total costs.
E) positive because revenues are increasing faster than variable costs.

Answer: C
Diff: 3
Section: 8.6

73) Three hundred firms supply the market for paint. For fifty of the firms, their short–run average variable costs are minimized at $10 and short–run total costs are minimized at $15. For the remaining firms, the short–run average variable costs and short–run average total costs are minimized at $20 and $25, respectively. If each firm has a U–shaped marginal cost curve then the short–run market supply curve is
A) U–shaped too
B) kinked at $10
C) kinked at $15
D) kinked at $20
E) kinked at $25

Answer: D
Diff: 3
Section: 8.6

74) An industry has 1000 competitive firms, each producing 50 tons of output. At the current market price of $10, half of the firms have a short–run supply curve with a slope of 1; the other half each have a short–run supply curve with slope 2. The short–run elasticity of market supply is
A) 1/50
B) 3/10
C) 1/5
D) 2/5
E) none of the above

Answer: B
Diff: 3
Section: 8.6

75) Imposition of an output tax on all firms in a competitive industry will result in
A) a downward shift in each firm's marginal cost curve.
B) a downward shift in each firm's average cost curve.
C) a leftward shift in the market supply curve.
D) the entry of new firms into the industry.
E) higher profits for the industry as price rises.

Answer: C
Diff: 1
Section: 8.6

76) Suppose all firms have constant marginal costs that are the same for each firm in the short run. In this case, the market level supply curve is _____ and producer surplus equals _____:

A) perfectly inelastic, fixed costs
B) perfectly inelastic, zero
C) perfectly elastic, fixed costs
D) perfectly elastic, zero

Answer: D
Diff: 2
Section: 8.6

77) One practical implication of a kinked market supply curve is that:

A) producer surplus is not defined at the kink point.
B) the MC = MR rule does not hold at the kink point.
C) the market supply elasticity for a price increase may be different than the market supply elasticity for a price decrease at the kink point.
D) All of the above are true.

Answer: C
Diff: 2
Section: 8.6

78) In the long run, a firm's producer surplus is equal to the

A) economic rent it enjoys from its scarce inputs.
B) revenue it earns in the long run.
C) positive economic profit it earns in the long run.
D) difference between total revenue and total variable costs.
E) difference between total revenue and total fixed costs.

Answer: A
Diff: 3
Section: 8.7

79) Consider the following statements when answering this question

I. If the cost of producing each unit of output falls $5, then the short-run market price falls $5.

II. If the cost of producing each unit of output falls $5, then the long-run market price falls $5.

A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: C
Diff: 3
Section: 8.7

80) Consider the following statements when answering this question

I. Increases in the demand for a good, which is produced by a competitive industry, will raise the short-run market price.

II. Increases in the demand for a good, which is produced by a competitive industry will raise the long-run market price.

A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: B
Diff: 3
Section: 8.7

81) Consider the following statements when answering this question

I. In the long run, if a firm wants to remain in a competitive industry, then it needs to own resources that are in limited supply."

II. In this competitive market our firm's long run survival depends only on the efficiency of our production process.

A) I and II are true. B) I is true, and II is false.

C) I is false, and II is true. D) I and II are false.

Answer: C
Diff: 3
Section: 8.7

82) Consider the following statements when answering this question

I. In the long–run equilibrium of a perfectly competitive market, a firm's producer surplus equals the sum of the economic rents earned on its inputs to production.

II. In the long–run equilibrium of a perfectly competitive market, the amount of economic profit earned can differ across firms, but not the amount of producer surplus.

A) I and II are true. B) I is true, and II is false.

C) I is false, and II is true. D) I and II are false.

Answer: B
Diff: 3
Section: 8.7

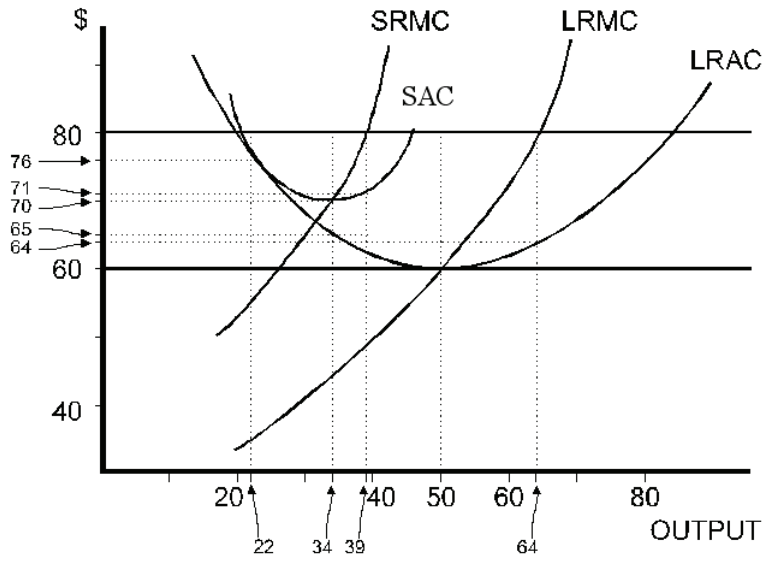


Figure 8.2

83) Refer to Figure 8.2. At P = $80, the profit–maximizing output in the short run is

A) 22. B) 34. C) 39. D) 50. E) 64.

Answer: C
Diff: 1
Section: 8.7

84) Refer to Figure 8.2. At P = $80, how much is profit in the short run?
A) $88 B) $306 C) $351 D) $1000 E) $1024

Answer: C
Diff: 1
Section: 8.7

85) Refer to Figure 8.2. If the firm expects $80 to be the long–run price, how many units of output will it plan to produce in the long run?
A) 22 B) 34 C) 38 D) 50 E) 64

Answer: E
Diff: 1
Section: 8.7

86) Refer to Figure 8.2. How much profit will the firm earn if price stays at $80?
A) $0 B) $306 C) $312 D) $1000 E) $1024

Answer: E
Diff: 1
Section: 8.7

87) Refer to Figure 8.2. As the firm makes its long–run adjustment, which must be true?
A) It takes advantage of increasing returns to scale.
B) It suffers from decreasing returns to scale.
C) It takes advantage of increasing marginal product.
D) It takes advantage of economies of scale.
E) It takes advantage of diseconomies of scale.

Answer: D
Diff: 1
Section: 8.7

88) Refer to Figure 8.2. As the competitive industry, not just the firm in question, moves toward long–run equilibrium, the firm will be forced to operate at what level of output?
A) 22 B) 34 C) 38. D) 50 E) 64

Answer: D
Diff: 1
Section: 8.7

89) Refer to Figure 8.2. As the competitive industry, not just the firm in question, moves toward long–run equilibrium, what will the price be?
A) $60 B) $64 C) $70 D) $71 E) $80

Answer: A
Diff: 1
Section: 8.7

90) Refer to Figure 8.2. As the competitive industry, not just the firm in question, moves toward long–run equilibrium, how much profit will the firm earn?
A) $0 B) $306 C) $312 D) $1000. E) $1024

Answer: A
Diff: 1
Section: 8.7

91) In long–run competitive equilibrium, a firm that owns factors of production will have an
A) economic profit = $0 and accounting profit > $0.
B) economic profit > $0 and accounting profit = $0.
C) economic and accounting profit = $0.
D) economic and accounting profit > $0.
E) economic and accounting profit can take any value.

Answer: A
Diff: 3
Section: 8.7

92) What happens in a perfectly competitive industry when economic profit is greater than zero?
A) Existing firms may get larger.
B) New firms may enter the industry.
C) Firms may move along their LRAC curves to new outputs.
D) There may be pressure on prices to fall.
E) All of the above may occur.

Answer: E
Diff: 3
Section: 8.7

93) Which of the following is NOT a necessary condition for long–run equilibrium under perfect competition?
A) No firm has an incentive to enter the market.
B) No firm has an incentive to exit the market.
C) Prices are relatively low.
D) Each firm earns zero economic profit.
E) Each firm is maximizing profit.

Answer: C
Diff: 2
Section: 8.7

94) Although the long–run equilibrium price of oil is $80 per barrel, some producers have much lower costs because their oil reserves are relatively close to the surface and are easier to extract. If the low–cost producers have a minimum LAC equal to $20 per barrel, then the difference ($60 per barrel) is:
A) an above–normal economic profit.
B) an economic rent due to the scarcity of low–cost oil reserves.
C) a profit that will go to zero as new oil producers enter the market.
D) none of the above

Answer: B
Diff: 2
Section: 8.7

95) Economic rents are typically counted as:
A) accounting costs but not economic costs.
B) accounting and economic costs.
C) economic costs but not accounting costs.
D) none of the above

Answer: C
Diff: 1
Section: 8.7

Scenario 8.2:
Yachts are produced by a perfectly competitive industry in Dystopia. Industry output (Q) is currently 30,000 yachts per year. The government, in an attempt to raise revenue, places a $20,000 tax on each yacht. Demand is highly, but not perfectly, elastic.

96) Refer to Scenario 8.2. The result of the tax in the long run will be that
A) Q falls from 30,000; P rises by less than $20,000.
B) Q falls from 30,000; P rises by $20,000.
C) Q falls from 30,000; P does not change.
D) Q stays at 30,000; P rises by $20,000.
E) Q stays at 30,000; P rises by less than $20,000.

Answer: A
Diff: 1
Section: 8.8

97) Refer to Scenario 8.2. The more elastic is demand for yachts,
A) the more Q will fall and the more P will rise.
B) the less Q will fall and the more P will rise.
C) the more Q will fall and the less P will rise.
D) the less Q will fall and the less P will rise.
E) the closer is the new equilibrium point to the old.

Answer: C
Diff: 2
Section: 8.8

98) Generally, long–run elasticities of supply are
A) greater than short–run elasticities, because existing inventories can be exploited during shortages.
B) greater than short–run elasticities, because consumers have time to find substitutes for the good.
C) greater than short–run elasticities, because firms can make alterations to plant size and input combinations to be more flexible in production.
D) smaller than short–run elasticities, because the firm has made long–term commitments it cannot easily modify.
E) the same as short–run elasticities, because technology is not assumed to change in the long–run adjustment process.

Answer: C
Diff: 1
Section: 8.8

99) In a constant–cost industry, an increase in demand will be followed by
A) no increase in supply.
B) an increase in supply that will not change price from the higher level that occurs after the demand shift.
C) an increase in supply that will bring price down to the level it was before the demand shift.
D) an increase in supply that will bring price down below the level it was before the demand shift.
E) a decrease in demand to keep price constant.

Answer: C
Diff: 2
Section: 8.8

100) In a constant–cost industry, price always equals
A) LRMC and minimum LRAC.
B) LRMC and LRAC, but not necessarily minimum LRAC.
C) minimum LRAC, but not LRMC.
D) LRAC and minimum LRMC.
E) minimum LRAC and minimum LRMC.

Answer: A
Diff: 2
Section: 8.8

101) In an increasing–cost industry, expansion of output
A) causes input prices to rise as demand for them grows.
B) leaves input prices constant as input demand grows.
C) causes economies of scale to occur.
D) occurs under conditions of increasing returns to scale.
E) occurs without diminishing marginal product.

Answer: A
Diff: 2
Section: 8.8

102) The long–run supply curve in a constant–cost industry is linear and
A) upward–sloping.
B) downward–sloping.
C) horizontal.
D) vertical.
E) could have any constant slope.

Answer: C
Diff: 1
Section: 8.8

103) An increasing–cost industry is so named because of the positive slope of which curve?
A) Each firm's short–run average cost curve
B) Each firm's short–run marginal cost curve
C) Each firm's long–run average cost curve
D) Each firm's long–run marginal cost curve
E) The industry's long–run supply curve

Answer: E
Diff: 1
Section: 8.8

104) A decreasing–cost industry has a downward–sloping
A) long–run average cost curve.
B) long–run marginal cost curve.
C) short–run average cost curve.
D) short–run marginal cost curve.
E) long–run industry supply curve.

Answer: E
Diff: 1
Section: 8.8

105) Which of the following cases are examples of industries that have potentially increasing costs due to scarce inputs?
A) Petroleum production
B) Medical care
C) Legal services
D) all of the above

Answer: D
Diff: 1
Section: 8.8

106) Which of the following events does NOT occur when market demand shifts leftward in an increasing–cost industry?
A) Initially, the output produced by existing firms declines along the short–run market supply curve.
B) The market price declines below the minimum LAC due to the short–run supply response.
C) The market supply curve shifts leftward as some firms exit the market when the market price is below the minimum LAC.
D) As firms exit, the market price rises and attracts other firms to enter the market.
E) The LAC curve shifts downward as output falls.

Answer: D
Diff: 3
Section: 8.8

107) The following table contains information for a price taking competitive firm. Complete the table and determine the profit maximizing level of output (round your answer to the nearest whole number).

Output	Total Cost	Marginal Cost	Fixed Cost	Average Cost	Total Revenue	Average Revenue	Marginal Revenue
0	5				0		
1	7				10		
2	11				20		
3	17				30		
4	27				40		
5	41				50		
6	61				60		

Answer:

Output	Total Cost	Marginal Cost	Fixed Cost	Average Cost	Total Revenue	Average Revenue	Marginal Revenue
0	5	–	5	–	0	–	–
1	7	2	5	7	10	10	10
2	11	4	5	5.5	20	10	10
3	17	6	5	6	30	10	10
4	27	10	5	7	40	10	10
5	41	14	5	8	50	10	10
6	61	20	5	10	60	10	10

The profit maximizing level of output is either 3 or 4. Note that at Q = 4 the profit–maximizing condition MR = MC is satisfied. Since this problem is discrete, the profit at Q = 3 happens to be the same as the profit at Q = 4, so either of these answers is correct.

Diff: 2
Section: 8.3

108) The following table contains information for a price taking competitive firm. Complete the table and determine the profit maximizing level of output (round your answer to the nearest whole number).

Output	Total Cost	Marginal Cost	Fixed Cost	Average Cost	Total Revenue	Average Revenue	Marginal Revenue
0			25				
1	35						
2				30			
3		45					
4	185						
5				57			
6		120			240		

Answer:

Output	Total Cost	Marginal Cost	Fixed Cost	Average Cost	Total Revenue	Average Revenue	Marginal Revenue
0	25	–	25	–	0	–	–
1	35	10	25	35	40	40	40
2	60	25	25	30	80	40	40
3	105	45	25	35	120	40	40
4	185	80	25	46	160	40	40
5	285	100	25	57	200	40	40
6	405	120	25	66	240	40	40

The profit maximizing level of output is 2.

Diff: 1
Section: 8.3

109) Conigan Box Company produces cardboard boxes that are sold in bundles of 1000 boxes. The market is highly competitive, with boxes currently selling for $100 per thousand. Conigan's total and marginal cost curves are:

$TC = 3{,}000{,}000 + 0.001Q^2$

$MC = 0.002Q$

where Q is measured in thousand box bundles per year.

a. Calculate Conigan's profit maximizing quantity. Is the firm earning a profit?

b. Analyze Conigan's position in terms of the shutdown condition. Should Conigan operate or shut down in the shortrun?

Answer: ***a.***

Given the competitive nature of the industry, Conigan should equate P to MC.

$100 = 0.002Q$

$Q = 50{,}000$

To determine profit:

$\pi = TR - TC$

$TR = PQ$

$TR = \$100 \cdot 50{,}000$

$TR = 5{,}000{,}000$

$TC = 3{,}000{,}000 + 0.001(50{,}000)^2$

$TC = 3{,}000{,}000 + 2{,}500{,}000$

$TC = 5{,}500{,}000$

$\pi = 5{,}000{,}000 - 5{,}500{,}000$

$\pi = -500$

Conigan is losing $500,000 per year.

b.

To determine if the firm should operate or shutdown, we must compare P to AVC.

$$AVC = \frac{TVC}{Q}$$

$TVC = TC - TFC$

$TVC = 5{,}500{,}000 - 3{,}000{,}000$

$TVC = 2{,}500{,}000$

$$AVC = \frac{2{,}500{,}000}{50{,}000} = \$50$$

$AVC = 50; \quad P = \$100$

The firm should operate since P > AVC.

Diff: 1
Section: 8.4

110) The table below lists the short–run costs for One Guy's Pizza. If One Guy's can sell all the output they produce for $12 per unit, how much should One Guy's produce to maximize profits? Does One Guy's Pizza earn an economic profit in the short–run?

Q	TFC	TVC	ATC	AVC	MC	Profits
58	100	336.4				
59	100	348.1				
60	100	360				
61	100	372.1				

Answer:

Q	TFC	TVC	ATC	AVC	MC	Profits
58	100	336.4	7.52	5.8	11.7	259.6
59	100	348.1	7.59	5.9	11.9	259.9
60	100	360	7.67	6.0	12.1	260
61	100	372.1	7.74	6.1		259.9

The optimal output for One Guy's Pizza is at 60 units. At this output level, One Guy's Pizza earns a profit of $260.

Diff: 1
Section: 8.4

111) Spacely Sprockets' short–run cost curve is: $C(q, K) = \frac{25q^2}{K} + 15K$, where q is the number of Sprockets produced and K is the number of robot hours Spacely hires. Currently, Spacely hires 10 robot hours per period. The short–run marginal cost curve is: $MC(q, K) = 50\frac{q}{K}$. If Spacely receives $250 for every sprocket he produces, what is his profit maximizing output level? Calculate Spacely's profits.

Answer: The profit maximizing output level is where the market price equals marginal cost (providing the price exceeds the average variable cost). To determine the optimal output level, we need to first equate marginal cost to the market price. That is, $MC(q, K) = 50\frac{q}{10} = P = 250 \Leftrightarrow q = 50$. The average variable cost at this output level is: $AVC(50, 10) = \frac{25q}{K} = \frac{25(50)}{10} = 125$. Since $P > AVC(50, 10)$, Spacely will maximize profits at 50 units. Spacely's profits are:

$$\pi = Pq - C(q, 10) = 250(50) - \left\{\frac{25(50)^2}{10} + 15(10)\right\} = 6{,}100.$$

Diff: 2
Section: 8.4

112) Laura's internet services has the following short–run cost curve: $C(q, K) = \frac{25q^3}{K^{2/3}} + rK$ where q is Laura's output level, K is the number of servers she leases and r is the lease rate of servers. Laura's short–run marginal cost function is: $MC(q, K) = \frac{50q}{K^{2/3}}$. Currently, Laura leases 8 servers, the lease rate of servers is \$15, and Laura can sell all the output she produces for \$500. Find Laura's short–run profit maximizing level of output. Calculate Laura's profits. If the lease rate of internet servers rise to \$20, how does Laura's optimal output and profits change?

Answer: The profit maximizing output level is where the market price equals marginal cost (providing the price exceeds the average variable cost). To determine the optimal output level, we need to first equate marginal cost to the market price. That is, $MC(q, 8) = 50\frac{q}{(8)^{2/3}} = P = 500 \Leftrightarrow q = 40$. The average variable cost at this output level is:

$AVC(40, 8) = \frac{25q}{K^{2/3}} = \frac{25(40)}{4} = 250$. Since $P > AVC(40, 8)$, Laura will maximize profits at 4 units. Laura's profits are:

$\pi = Pq - C(q, 8) = 500(40) - \left\{\frac{25(40)^2}{4} + 15(8)\right\} = 9{,}880$. If the lease rate of servers rise to \$20, Laura's short–run output level doesn't change as average variable cost and marginal cost are unaffected by the lease rate. Laura's profits will be affected. New profits are:

$\pi_n = Pq - C(q, 8) = 500(40) - \left\{\frac{25(40)^2}{4} + 20(8)\right\} = 9{,}840$. Thus, the \$5 increase in the rental rate reduced Laura's short–run profits by \$40.

Diff: 2
Section: 8.4

113) Homer's Boat Manufacturing cost function is: $C(q) = \frac{75}{128}q^4 + 10{,}240$. The marginal cost function is: $MC(q) = \frac{75}{32}q^3$. If Homer can sell all the boats he produces for \$1,200, what is his optimal output? Calculate Homer's profit or loss.

Answer: The profit maximizing output level is where the market price equals marginal cost (providing the price exceeds the average variable cost). To determine the optimal output level, we need to first equate marginal cost to the market price. That is, $MC(q) = \frac{75}{32}q^3 = P = 1{,}200 \Leftrightarrow q = 8$. The average variable cost at this output level is:

$AVC(8) = \frac{75}{128}(8)^3 = \frac{75(512)}{128} = 300$. Since $P > AVC(8)$, Homer will maximize profits at 8 units. Homer's profits are:

$\pi = Pq - C(q) = 1{,}200(8) - \left\{\frac{75(8)^4}{128} + 10{,}240\right\} = -3{,}040$. Homer will produce and make a loss as losing \$3,040 is better than not producing and losing \$10,240.

Diff: 2
Section: 8.4

114) A competitive firm sells its product at a price of \$0.10 per unit. Its total and marginal cost functions are:

$$TC = 5 - 0.5Q + 0.001Q^2$$

$$MC = -0.5 + 0.002Q,$$

where TC is total cost (\$) and Q is output rate (units per time period).

a. Determine the output rate that maximizes profit or minimizes losses in the shortterm.
b. If input prices increase and cause the cost functions to become

$$TC = 5 - 0.10Q + 0.002Q^2$$

$$MC = -0.10 + 0.004Q,$$

what will the new equilibrium output rate be? Explain what happened to the profit maximizing output rate when input prices were increased.

Answer: ***a.***

$$TR = PQ = 0.10Q \qquad MR = 0.10$$

$$TC = 5 - 0.5Q + 0.001Q^2$$

$$MC = -0.5 + 0.002Q = 0.10 = MR$$

$$Q = 75$$

b.

$$MC = -0.10 + 0.004Q = 0.10 = MR$$

$$Q = 50$$

As a result of the increase in input costs, the firm's marginal cost increased. This caused the intersection of MC to occur at the lower production rate, 50 vs. 75. This also reduced the firm's level of profit.

Diff: 2
Section: 8.5

115) Sarah's Pretzel plant has the following short–run cost function: $C(q, K) = \frac{wq^3}{1000K^{3/2}} + 50K$

where q is Sarah's output level, w is the cost of a labor hour, and K is the number of pretzel machines Sarah leases. Sarah's short–run marginal cost curve is $MC(q, K) = \frac{3wq^2}{1000K^{3/2}}$. At the moment, Sarah leases 10 pretzel machines, the cost of a labor hour is \$6.85, and she can sell all the output she produces at \$35 per unit. If the cost per labor hour rises to \$7.50, what happens to Sarah's optimal level of output and profits?

Answer: First, we need to determine Sarah's optimal output and profits before the increase in the wage rate. The profit maximizing output level is where the market price equals marginal cost (providing the price exceeds the average variable cost). To determine the optimal output level, we need to first equate marginal cost to the market price. That is, $MC(q, K) = \frac{3wq^2}{1000K^{3/2}} = P = 35 \Leftrightarrow q = 232.07$. The average variable cost at this output level is:

$AVC(232.07, 10) = \frac{wq^2}{1000K^{3/2}} = \frac{6.85(232.07)^2}{1000(10)^{3/2}} = 11.67$. Since $P > AVC(232.07, 10)$, Sarah will maximize profits at 232.07 units. Sarah's profits are:

$\pi = Pq - C(q, 10) = 35(232.07) - \left\{\frac{6.85(232.07)^3}{1000(10)^{3/2}} + 50(10)\right\} = 4{,}915.08$. To determine the optimal output level at the higher wage rate, we need to first equate marginal cost to the market price. That is, $MC(q, K) = \frac{3(7.50)q^2}{1000(10)^{3/2}} = P = 35 \Leftrightarrow q = 221.79$. The average variable cost at this output level is:

$AVC(221.79, 10) = \frac{wq^2}{1000K^{3/2}} = \frac{7.50(221.79)^2}{1000(10)^{3/2}} = 11.66$. Since $P > AVC(221.79, 10)$, Sarah will maximize profits at 221.79 units. Sarah's profits are:

$\pi = Pq - C(q, 10) = 35(221.79) - \left\{\frac{7.50(221.79)^3}{1000(10)^{3/2}} + 50(10)\right\} = 4{,}675.11$. The higher wage rate causes Sarah to reduce output and her profits also fall. In this case, profits fall by 4.9% when the wage rate rises by 9.5%.

Diff: 3
Section: 8.5

116) The market demand for a type of carpet known as KP–7 has been estimated as:

$$P = 40 - 0.25Q,$$

where P is price ($/yard) and Q is rate of sales (hundreds of yards per month). The market supply is expressed as:

$$P = 5.0 + 0.05Q.$$

A typical firm in this market has a total cost function given as:

$$C = 100 - 20.0q + 2.0q^2.$$

a. Determine the equilibrium market output rate and price.
b. Determine the output rate for a typical firm.
c. Determine the rate of profit (or loss) earned by the typical firm.

Answer: ***a.*** Equate supply to demand to get Q.

$$40 - 0.25Q = 5.0 + 0.05Q$$
$$0.30Q = 35$$
$$Q = 116.7 \text{ (hundreds of yards per month)}$$
$$P = 40 - 0.25(116.7) = \$10.825 \text{ / yard}$$

b. The typical firm produces where MC equals P.

$$MC = -20 + 4q$$
$$10.825 = -20 + 4q$$
$$q = 7.71 \text{ (hundreds of yards per month)}$$

c. The profit rate is as follows:

$R(Q) = PQ = (10.825)(7.71) = 83.461$

$TC = 100 - 20(7.71) + 2(7.71)^2 = 64.69$

Profit = $18.77 (hundreds / month)

Diff: 1
Section: 8.6

117) A competitive market is made up of 100 identical firms. Each firm has a short–run marginal cost function as follows:

$$MC = 5 + 0.5Q,$$

where Q represents units of output per unit of time. The firm's average variable cost curve intersects the marginal cost at a vertical distance of 10 above the horizontal axis. Determine the market short–run supply curve. Calculate the price that would make 2,000 units forthcoming per time period. Note the minimum price at which any quantity would be placed on the market.

Answer: The market supply curve is the horizontal summation of the individual firms' MC curves above the intersection with the respective average variable cost curves. We must express the quantity in terms of MC or:

$$Q = 2MC - 10.$$

Now add the 100 short–run supply curves together:

$$Q_1 = 2MC - 10$$
$$Q_2 = 2MC - 10$$
$$\vdots$$
$$Q_{100} = 2MC - 10$$

$$\sum Q = 200MC - 1000$$

Now, solve for MC

$$MC = \frac{\Sigma Q + 1000}{200}$$

$$MC = 0.005\Sigma Q + 5 \text{ (above MC = 10)}$$

At $\Sigma Q = 2000$, the price would be

$$P = MC = 0.005(2000) + 5 = \$15 \text{ per unit.}$$

The lowest point on the supply curve would be just above the intersection with the average variable cost curve (at 10 units above the horizontal axis).

Diff: 1
Section: 8.6

118) The market for wheat consists of 500 identical firms, each with the total and marginal cost functions shown:

$TC = 90{,}000 + 0.00001Q^2$

$MC = 0.00002Q,$

where Q is measured in bushels per year. The market demand curve for wheat is $Q = 90{,}000{,}000 - 20{,}000{,}000P$, where Q is again measured in bushels and P is the price per bushel.

a. Determine the short–run equilibrium price and quantity that would exist in the market.
b. Calculate the profit maximizing quantity for the individual firm. Calculate the firm's short–run profit (loss) at that quantity.
c. Assume that the short–run profit or loss is representative of the current long–run prospects in this market. You may further assume that there are no barriers to entry or exit in the market. Describe the expected long–run response to the conditions described in part b. (The TC function for the firm may be regarded as an economic cost function that captures all implicit and explicit costs.)

Answer: ***a.***

Market supply is horizontal sum of individual firm supply (firm's MC curve).

Firm's $TC = 90{,}000 + 0.00001Q^2$

$MC = 0.00002Q = P.$

Solve for Q in terms of P to express as supply curve

$P = 0.00002Q$

$Q = 50{,}000P$

Market supply curve is horizontal sum of firm supply curve or N–times the firm supply curve (N is the number of firms).

$Q_S = 500(50{,}000)P$

$Q_S = 25{,}000{,}000P$

equate Q_S and Q_D to determine price and quantity

$25{,}000{,}000P = 90{,}000{,}000 - 20{,}000{,}000P$

$45{,}000{,}000P = 90{,}000{,}000$

$P = \$2.00$

$Q = 25{,}000{,}000P$

$Q = 25{,}000{,}000(2)$

$Q = 50{,}000{,}000$

b.

To determine the firm's output, equate price and marginal cost – Firm's $MC = 0.00002Q$.

$P = 2 = 0.00002Q$

$Q = 100{,}000$

Firm's $\pi = TR - TC$

$TR = 2.00(100{,}000)$

$TR = 200{,}000$

$TC = 90{,}000 + 0.00001Q^2$

$TC = 90{,}000 + 0.00001(100{,}000)^2$

$TC = 190{,}000$

$\pi = 200{,}000{,}000 - 190{,}000 = 10{,}000$

c.

Firms are earning economic profit so we would expect entry to occur, causing the

market supply curve to shift rightward. As the market supply curve shifts rightward, price falls, which in turn causes each firm to reduce its output. This will continue until we reach long–run equilibrium at zero profit.

Diff: 2
Section: 8.6

119) The market demand for a type of carpet known as KS–12 has been estimated as

$$P = 75 - 1.5Q,$$

where P is price ($/yard), and Q is output per time period (thousands of yards per month). The market supply is expressed as $P = 25 + 0.50Q$. A typical competitive firm that markets this type of carpet has a marginal cost of production of

$$MC = 2.5 + 10q.$$

a. Determine the market equilibrium price for this type of carpet. Also determine the production rate in the market.
b. Determine how much the typical firm will produce per week at the equilibrium price.
c. If all firms had the same cost structure, how many firms would compete at the equilibrium price computed in (a) above?
d. Determine the producer surplus the typical firm has under the conditions described above. (Hint: Note that the marginal cost function is linear.)

Answer: ***a.***

Market equilibrium price is found by equating S and D.

$$75 - 1.5Q = 25 + 0.50Q$$
$$50 = 2Q$$
$$Q = 25 \text{ (thousand yards per month)}$$

The equilibrium selling price is

$P = 75 - 1.5(25) = \$37.5$/yard.

b.

Since the firm's supply is based on its MC curve, we can use MC to determine production rate.

$$P = 37.5 = MC = 2.5 + 10q$$
$$q = \frac{35}{10} = 3.5 \text{ (thousand yards / month)}$$

c.

Since each firm produces 3.5 thousand yards per month and total production is at 25 thousand yards per month, a total of 7.14 firms would be needed.

d.

Producer surplus is the area between the price of $37.5 and MC, bounded by zero and 3.5 units of output for the typical firm. The bounded area is a triangle.

$$\text{Area} = \frac{1}{2}b \cdot h = (0.5)(3.5)(37.5 - 2.5) = \$61.25 \text{ (thousand)}$$

Diff: 1
Section: 8.6

120) Assume the market for tortillas is perfectly competitive. The market supply and demand curves for tortillas are given as follows:
supply curve:
P = .000002Q demand curve: P = 11 – .00002Q
The short run marginal cost curve for a typical tortilla factory is:
MC = .1 + .0009Q

a. Determine the equilibrium price for tortillas.
b. Determine the profit maximizing short run equilibrium level of output for a tortilla factory.
c. At the level of output determined above, is the factory making a profit, breaking–even, or making a loss? Explain your answer.
d. Assuming that all of the tortilla factories are identical, how many tortilla factories are producing tortillas?

Answer: ***a.***
The equilibrium price is the price at which the quantity supplied equals the quantity demanded. Therefore,
.000002Q = 11 – .00002Q
Q = 500,000
P = 1

b.
The profit maximizing short run equilibrium level of output for a tortilla factory is found where marginal revenue equals marginal cost. For a perfectly competitive firm, marginal revenue equals price. Therefore,
P = MC
1 = .1 + .0009Q
Q = 1,000

c.
Given the information provided, it cannot be determined whether the firm is making a profit or a loss, because total cost cannot be determined from marginal cost.

d.
Since Q = 500,000 and Q = 1,000, there must be 500 firms.

Diff: 2
Section: 8.6

121) In the local cotton market, there are 1,000 producers that have identical short–run cost functions. They are: $C(q) = 0.025q^2 + 200$, where q is the number of bales produced each period. The short–run marginal cost function for each producer is: $MC(q) = 0.05q$. If the local cotton market is perfectly competitive, what is each cotton producer's short–run supply curve? Derive the local market supply curve of cotton.

Answer: Given the cotton market is competitive, the firms will set their marginal cost to the market price (i.e., they are price takers). The quantity supplied by each cotton producer can be found as follows:
$MC(q) = 0.05q = P \Leftrightarrow q = 20P$. To determine the market supply, we add the quantity supplied for all producers together at each price. Thus,
$Q_S = \sum_{i=1}^{1,000} 20P = 1000(20)\ P = 20{,}000P$. If we wanted to graph the supply with price on the vertical axis and quantity on the horizontal axis, we would solve the supply equation for price. This would be: $P = \frac{1}{20{,}000}Q_S$.

Diff: 2
Section: 8.6

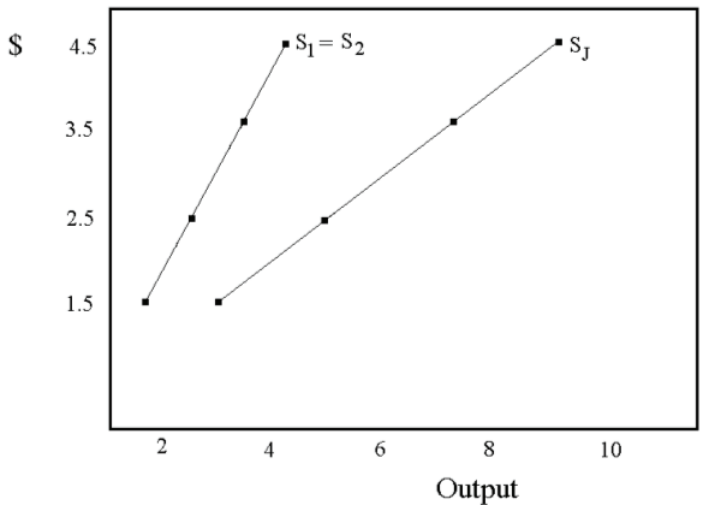
122) The table below provides cost information for two firms in a competitive industry. Graph the supply curves of the firms individually and jointly. For these two firms, at any positive output level, marginal cost exceeds average variable cost.

Q	Firm #1 Costs	Firm #2 Costs
1	25.5	30.5
2	27	32
3	29.5	34.5
4	33	38
5	37.5	42.5

Answer:

Q	Firm #1 Costs	MC	Firm #2 Costs	MC
1	25.5	1.5	30.5	1.5
2	27	2.5	32	2.5
3	29.5	3.5	34.5	3.5
4	33	4.5	38	4.5
5	37.5		42.5	

Since we know the industry is competitive and that the average variable cost is always exceeded by the marginal cost, the firm will be willing to supply the amount of output that sets the market price equal to the marginal cost in the short run. This implies we may graph Firm #1 (S1) and Firm #2 (S2) supply curves as indicated in the diagram below. To determine the joint supply (SJ) of these two firms, we add their individual supplies together for each price. The joint supply is indicated below.



Diff: 1
Section: 8.6

123) The marginal cost curves of six firms in an industry appear in the table below. If these firms behave competitively, determine the market supply curve. Calculate the elasticity of market supply at \$5.

Firm	Marginal cost
Firm #1	$3q_1 + 2$
Firm #2	$3q_2 + 1.5$
Firm #3	$3q_3 + 2.5$
Firm #4	$3q_4 + 2$
Firm #5	$3q_5 + 1.5$
Firm #6	$3q_6 + 2.5$

Answer: To determine each firm's individual supply, we need to solve for q when marginal cost is set equal to the market price. $MC(q_i) = 3q_i + b_i = \mathrm{P} \Rightarrow q_i = \frac{P - b_i}{3}$. We can then add each firm's individual supply together at each price to determine the market supply. This is done in the following table:

Firm	Marginal cost
Firm #1	$\frac{\mathrm{P} - 2}{3}$
Firm #2	$\frac{\mathrm{P} - 1.5}{3}$
Firm #3	$\frac{\mathrm{P} - 2.5}{3}$
Firm #4	$\frac{\mathrm{P} - 2}{3}$
Firm #5	$\frac{\mathrm{P} - 1.5}{3}$
Firm #6	$\frac{\mathrm{P} - 2.5}{3}$
Market	$2P - 4$

The market supply is the sum of all the firms' quantity supplied at each price. As the table indicates, the market supply is: $Q_S = 2P - 4$. At a price of \$5, the quantity supplied is 6. So, the point elasticity of supply at \$5 is: $E_S = \left(\frac{\Delta Q_S}{\Delta P}\right)\frac{P}{Q_S} = (2)\frac{5}{6} = \frac{5}{3}$.

Diff: 2
Section: 8.6

124) The long–run cost function for Jeremy's Jetski Rentals is: $C(q) = \frac{5}{2}q^2$. The long–run marginal cost function is $MC(q) = 5q$. If Jeremy can sell as many jetski rentals as he desires at \$50, calculate his optimal output in the long run.

Answer: Jeremy's optimal output occurs where price is equal to marginal cost if he can earn at least a normal profit at that output level. If not, his optimal output would be zero. First, we set
$MC(q) = P \Leftrightarrow 5q = 50 \Leftrightarrow q = 10$. At this output level, Jeremy's average costs are:
$AC(q) = \frac{5(10)}{2} = 25$. Since price exceeds Jeremy's Average costs, Jeremy will maximize profits by producing 10 units of output.

Diff: 2
Section: 8.7

125) The long–run cost function for LeAnn's telecommunication firm is: $C(q) = 0.03q^2$. A local telecommunication tax of \$0.01 has been implemented for each unit LeAnn sells. This implies the marginal cost function becomes: $MC(q, t) = 0.06q + t$. If LeAnn can sell all the units she produces at the market price of \$0.70, calculate LeAnn's optimal output before and after the tax. What effect did the tax have on LeAnn's output level? How did LeAnn's profits change?

Answer: The profit maximizing output level is where the market price equals marginal cost (providing the price exceeds the average variable cost). To determine the optimal output level, we need to first equate marginal cost to the market price. That is,
$MC(q,0) = 0.06q + (0) = P = 0.7 \Leftrightarrow q = 11\frac{2}{3}$.

The average variable cost at this output level is:
$AVC\left(11\frac{2}{3}\right) = 0.03\left(11\frac{2}{3}\right) = 0.35$. Since $P > AVC\left(11\frac{2}{3}\right)$, LeAnn will maximize profits at $11\frac{2}{3}$ units. LeAnn's profits are:

$$\pi = Pq - C(q) = 0.70\left(11\frac{2}{3}\right) - \left\{0.03\left(11\frac{2}{3}\right)^2\right\} = 4\frac{1}{12}.$$

With the tax, LeAnn's optimal output level requires:
$MC(q, 0.01) = 0.06q + (0.01) = P = 0.7 \Leftrightarrow q = 11.5$. The average variable cost at this output level is: $AVC(11.5) = 0.03(11.5) + .01 = 0.355$. Since $P > AVC(11.5)$, LeAnn will maximize profits at 11.5 units. LeAnn's profit with the tax is:
$\pi = Pq - C(q) = 0.70(11.5) - \left\{0.03(11.5)^2 + 0.01(11.5)\right\} = 3.9675$. The tax reduces LeAnn's output and profit.

Diff: 2
Section: 8.7

126) The squishy industry is competitive and the market price is \$0.80. Apu's long–run cost function is: $C(q, r) = \frac{0.436}{3} r^{3/2} q^{3/2}$, where r is the price Apu pays to lease a squishy machine and q is squishy output. The long–run marginal cost curve is: $MC(r, q) = 0.218 r^{3/2} q^{1/2}$. What is Apu's optimal output if the price Apu pays to lease a squishy machine is \$1.10? Suppose the lease price of squishy machines falls by \$0.55. What happens to Apu's optimal output if the market price for a squishy remains at \$0.80? Did profits increase for Apu when the lease rate of squishy machines fell?

Answer: The profit maximizing output level is where the market price equals marginal cost (providing the price exceeds the average cost). To determine the optimal output level, we need to first equate marginal cost to the market price. That is,

$MC(q, 1.10) = 0.218(1.10)^{3/2} q^{1/2} = P = 0.8 \Leftrightarrow q = 10.12$. The average variable cost at this output level is: $AC(10.12) = \frac{0.436}{3}(1.1)^{3/2} 10.12^{1/2} = 1.69$. Since $P < AC(10.12)$, Apu will maximize profits by producing 0 units. Apu's profits will also be zero. If the lease rate of squishy machines fall by \$0.55, the optimal output will be determined by:

$MC(q, 0.55) = 0.218(0.55)^{3/2} q^{1/2} = P = 0.8 \Leftrightarrow q = 17.65$. The average variable cost at this output level is: $AC(17.65) = \frac{0.436}{3}(0.55)^{3/2} 17.65^{1/2} = 1.05$. Since $P < AC(17.65)$, Apu will maximize profits at 0 units. Apu's profits remain at zero even though squishy machines have fallen in price by 50%.

Diff: 2
Section: 8.7

127) Bud Owen operates Bud's Package Store in a small college town. Bud sells six packs of beer for off–premises consumption. Bud has very limited store space and has decided to limit his product line to one brand of beer, choosing to forego the snack food lines that normally accompany his business. Bud's is the only beer retailer physically located within the town limits. He faces considerable competition, however, from sellers located outside of town. Bud regards the market as highly competitive and considers the current $2.50 per six pack selling price to be beyond his control. Bud's total and marginal cost functions are:

$TC = 2000 + 0.0005Q^2$

$MC = 0.001Q,$

where Q refers to six packs per week. Included in the fixed cost figure is a $750 per week salary for Bud, which he considers to be his opportunity cost.

a. Calculate the profit maximizing output for Bud. What is his profit? Is this an economic profit or an accounting profit?

b. The town council has voted to impose a tax of $.50 per six pack sold in the town, hoping to discourage beer consumption. What impact will the tax have on Bud? Should Bud continue to operate? What impact will the tax have on Bud's out–of–town competitors?

Answer: ***a.***

Given the competitive nature of the market, Bud should equate P to MC.

$2.50 = 0.001Q$

$Q = 2500$

$TR = 2.5 \times 2500 = 6250$

$TC = 2000 + 0.0005(2500)^2$

$TC = 2000 + 3125$

$TC = 5125$

$\pi = 6250 - 5125$

$\pi = 1{,}125$

Since the cost function is an economic cost function, we can conclude that this is an economic profit.

b.

Tax shifts total cost curve to:

$TC = 2000 + 0.0005Q^2 + 0.5Q$

MC becomes

$MC = 0.001Q + 0.5$

setting P = MC

$\$2.50 = 0.001Q + 0.5$

$2.00 = 0.001Q$

$Q = 2000$

$TR = 2.50 \times 2000$

$TR = 5000$

$TC = 2000 + 0.0005(2000)^2 + 0.5(2000)$

$TC = 2000 + 2000 + 1000$

$TC = 5000$

$\pi = 5000 - 5000$
$\pi = 0$

Given that this is zero economic profit, Bud should continue operating.

The impact upon Bud's competitors will be favorable or neutral. As he curtails output, 500 six packs worth of business will either shift elsewhere or choose temperance.

Diff: 2
Section: 8.8

128) Consider a competitive market in which the market demand for the product is expressed as

$$P = 75 - 1.5Q,$$

and the supply of the product is expressed as

$$P = 25 + 0.50Q.$$

Price, P, is in dollars per unit sold, and Q represents rate of production and sales in hundreds of units per day. The typical firm in this market has a marginal cost of

$$MC = 2.5 + 10q.$$

a. Determine the equilibrium market price and rate of sales.
b. Determine the rate of sales of the typical firm, given your answerto part (a) above.
c. If the market demand were to increase to $P = 100 - 1.5Q$, what would the new price and rate of sales in the market be? What would the new rate of sales for the typical firm be?
d. If the original supply and demand represented a long–run equilibrium condition in the market, would the new equilibrium (c) represent a new long–run equilibrium for the typical firm? Explain.

Answer: ***a.***

The equilibrium price and rate of sales are computed by equating supply to demand.

$$25 + 0.5Q = 75 - 1.5Q$$
$$2Q = 50$$
$$Q = 25 \text{ (hundreds per day)}$$

The equilibrium price is

$$P = 75 - 1.5Q$$
$$= 75 - 1.5(25)$$
$$= \$37.5$$

b.

Since the firm's supply curve is its MC, we can determine the rate of sales of the firm by inserting \$37.5 for price (MC) into the MC equation to get q for the firm.

$$MC = \$37.5 = 2.5 + 10q.$$
$$q = 3.5 \quad \text{(hundreds per day)}$$

c.

The new market equilibrium price is

$$25 + 0.50Q = 100 - 1.5Q$$
$$Q = 75 / 2 \text{ (hundreds per day)}$$
$$P = 100 - 1.5(37.5) = \$43.75 / \text{unit}$$

Now the typical firm would sell daily:

$$MC = 43.75 = 2.5 + 10q$$
$$q = 4.126 \quad \text{(hundred per day)}$$

d.

The original supply and demand represented long–run equilibrium and a breakeven situation for the typical firm. With the new higher demand in (c), the typical firm would likely be earning a positive economic profit because price and output are both higher. This apparent positive profit would encourage more firms to enter the market, which would increase market supply. So, the new equilibrium would not represent a long–run equilibrium for the firm or the market.

Diff: 2
Section: 8.8

129) In the long–run equilibrium of a competitive market, the market supply and demand are:

Supply: $P = 30 + 0.50Q$

Demand: $P = 100 - 1.5Q$,

where P is dollars per unit and Q is rate of production and sales in hundreds of units per day. A typical firm in this market has a marginal cost of production expressed as:

$MC = 3.0 + 15q$.

a. Determine the market equilibrium rate of sales and price.

b. Determine the rate of sales by the typical firm.

c. Determine the economic rent that the typical firm enjoys. (Hint: Note that the marginal cost function is linear.)

d. If an output tax is imposed on ONE firm's output such that the ONE firm has a new marginal cost (including the tax) of:

$MC_t = 5 + 15q$,

what will the firm's new rate of production be after the tax is imposed? How does this new production rate compare with the pre–tax rate? Is it as expected? Explain. Would the effect have been the same if the tax had been imposed on all firms equally? Explain.

Answer: ***a.***

The market equilibrium price and sales rate are determined as follows:

Supply = Demand

$30 + 0.50Q = 100 - 1.5Q$

$Q = 70/2 = 35$ (hundred per day)

$P = 30 + 0.50(35) = \$47.5$ / unit

b.

The rate of sales by the typical firm is determined from the firm's MC curve.

$MC = 47.5 = 3 + 15q$

$q = 2.967$ (hundred per day)

c.

The economic rent that the firm earns in the long–run is equal to the producer surplus that it generates. The producer surplus is the area of the triangle bounded by price, MC, and production rate, a triangle.

$P = 47.5$ $q = 2.833$ MC (lower point) = 3

Economic rent = $(1/2)b \cdot h = (0.5)(2.967)(47.5 - 3)$

$= \$66.016$ (hundreds)

d.

The market price is expected to stay the same since the tax is imposed on the one firm. Thus, the production rate for the firm is determined at the intersection of price and MCt of the firm.

$47.5 = 5 + 15q$

$q = 2.833$ (hundreds of units per day)

This production rate is slightly less than the pre–tax rate, as expected. The tax had the effect of shifting the MC curve vertically upward. This resulted in an intersection with the price line at 2.833 instead of 2.967.

The effect would not have been the same if the tax had been imposed equally on all firms. With the tax on all firms, the equilibrium market price would have increased. The industry supply curve would have shifted upward and total industry output would have decreased. Instead of the one firm being affected with one firm being taxed, the industry equilibrium price and output would be affected when the tax was imposed on all firms.

Diff: 2
Section: 8.8

130) The demand curve and long–run supply curve for carpet cleaning in the local market are: $Q_D = 1{,}000 - 10P$ and $Q_S = 640 + 2P$. The long–run cost function for a carpet cleaning business is: $C(q) = 3q^2$. The long–run marginal cost function is: $MC(q) = 6q$. If the carpet cleaning business is competitive, calculate the optimal output for each firm. How many firms are in the local market? Is the carpet cleaning industry an increasing, constant, or decreasing cost industry?

Answer: To determine optimal firm output, we first must calculate the market price. To do so we set market demand equal to market supply and solve for price. That is: $Q_D = 1{,}000 - 10P = Q_S = 640 + 2P \Rightarrow P = 30$. At this market price, 700 carpets will be cleaned. Since the industry is competitive, we know the firms are price takers and will set their marginal costs equal to the market price. This gives us: $MC(q) = 6q = 30 \Rightarrow q = 5$. Given each firm is cleaning 5 carpets per period and there are a total of 700 carpets cleaned each period in the market, there must be 140 firms. Since each firm's average costs are $AC(q) = \frac{3q^2}{q} = 3q$, increases in output raises the firm's average cost. Thus, each firm has increasing costs. Also, since the market supply curve is upward sloping in the long–run, as output expands in the long–run the industry is an increasing price industry.

Diff: 2
Section: 8.8

131) The demand for pizzas in the local market is given by: $Q_D = 25{,}000 - 1{,}500P$. There are 100 pizza firms currently in the market. The long–run cost function for each pizza firm is: $C(q, w) = \frac{10}{7}wq$, where w is the wage rate pizza firms pay for a labor hour and q is the number of pizzas produced. The marginal cost function for each firm is: $MC(q, w) = \frac{10}{7}w$. If the current wage rate is \$7 and the industry is competitive, calculate the optimal output of each firm given each firm produces the same level of output. Do you anticipate firms entering or exiting the pizza industry? Suppose that the wage rate increases to \$8.40. Calculate optimal output for each of the 100 firms. Do you anticipate firms entering or exiting the pizza industry? What happens to the market output of pizzas with the higher wage rate? What happens to the market price for pizza?

Answer: To determine the optimal output of each firm in a competitive industry, we know each firm will set their marginal cost to the market price. In this case, the marginal cost is constant at \$10. Thus, the market price must be \$10. At this price, 10,000 pizzas are demanded. Since there are 100 firms in the industry and they divide the industry output equally, each firm is producing 100 pizzas each period. The average cost per pizza in the long–run is equivalent to the price firms receive, thus, the firms are earning only the normal profit. This implies there is no incentive for firms to enter or exit the industry. If the wage rate rises to \$8.40, the marginal cost of producing a pizza rises to \$12. This implies that in the long–run, the market price of pizza will be \$12. At this price, consumers' quantity demanded of pizzas is 7,000. The optimal output for the 100 firms is 70 pizzas per firm. Since this is also a long–run equilibrium, there is no incentive for firms to enter or exit the industry. At the higher wage rate, the market output of pizzas decline. Also, the market price for pizzas increased by 20% when the wage rate increased by 20%.

Diff: 2
Section: 8.8

132) In the robotics industry there are 100 firms. Each firm shares the same long–run cost function. It is: $C(q) = 100\sqrt{q}$. The relevant marginal cost function is $MC(q) = \frac{50}{\sqrt{q}}$. Each of the 100 firms produce 64 units. The market demand for robotics is: $Q_D = 15{,}000 - 688P$. Calculate the market price at this production level. Also, calculate the profits for a representative firm in the robotics industry. If one firm expanded production to 100 units while the remaining 99 firms kept output at 64 units, what would happen to the market price and profits? Would all firms benefit or lose if every firm expanded output to 100 units?

Answer: If each firm is producing 64 units, the aggregate market output is 6,400. This implies that consumers are paying \$12.50 for each unit. Each firm is making a profit equal to: $\pi = 64(12.50) - 100(8) = 800 - 800 = 0$. If one firm expanded its output to 100 units while the remaining 99 firms kept their output at 64 units, there would be a total of 6,436 units brought to market. Using the market demand, we see that consumer's would pay \$12.448 per unit. The firm that expanded their production will earn: $\pi = 100(12.448) - 100(10) = 244.8$. The other 99 firms will earn: $\pi = 64(12.448) - 100(8) = -3.328$. The one firm who expands its operations are able to increase profits while the remaining 99 firms earn an economic loss. If every firm expanded production to 100 units, there would be 10,000 units produced. At this output level, consumers will pay \$7.267 per unit. This implies each firm will earn: $\pi = 7.267(100) - 100(10) = -273.3$. This implies that all of the firms are worse–off if everyone in the industry expands output to 100 units.

Diff: 2
Section: 8.8

133) The manufacturing of paper products causes damage to a local river when the manufacturing plant produces more than 1,000 units in a period. To discourage the plant from producing more than 1,000 units, the local community is considering placing a tax on the plant. The long–run cost curve for the paper producing firm is: $C(q, t) = \frac{q^2}{1500} + tq$, where q is the number of units of paper produced and t is the per unit tax on paper production. The relevant marginal cost curve is:

$MC(q, t) = \frac{q}{750} + t$. If the manufacturing plant can sell all of its output for \$2, what is the firm's optimal output if the tax is set at zero? What is the minimum tax rate necessary to ensure that the firm produces no more than 1,000 units? How much are the firm's profits reduced by the presence of a tax?

Answer: In the absence of a tax, we know the plant will maximize profits where marginal cost is equal to the price (given average costs exceed the market price). That is,

$MC(q, 0) = \frac{q}{750} + (0) = 2 \Rightarrow q = 1{,}500$. Thus, without a tax, we know the plant will produce at a level that will cause damage to the river. The firms profits at this level are: $\pi = 2(1{,}500) - \left\{\frac{(1{,}500)^2}{1{,}500} + 0\,(1{,}500)\right\} = 1{,}500$. To ensure that the plant doesn't go beyond 1,000 units of production, the community needs to make sure the firm's marginal cost is equivalent to the market price at 1,000 units or less. That is,

$MC(1000, t) = \frac{1000}{750} + t = 2 \Rightarrow t = 2 - 1\frac{1}{3} = \frac{2}{3}$. A tax of $2/3$ or greater will ensure the plant will not produce beyond 1,000 units. If we set the tax rate at $2/3$, the firm's profits will be: $\pi = 2(1{,}000) - \left\{\frac{(1{,}000)^2}{1{,}500} + \frac{2}{3}(1{,}000)\right\} = 666\frac{2}{3}$. Implementation of a tax equal to 2/3 will result in profits declining by 55.6%.

Diff: 3
Section: 8.8

Chapter 9 The Analysis of Competitive Markets

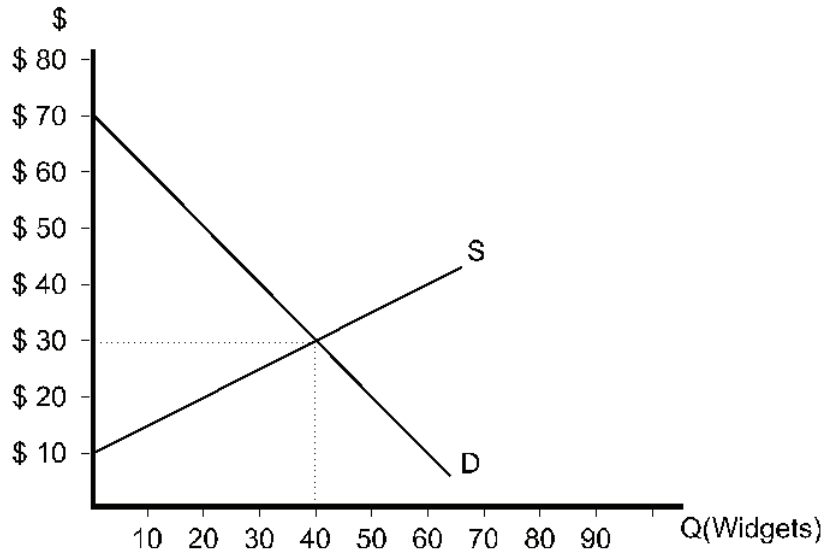


Figure 9.1

1) Refer to Figure 9.1. If the market is in equilibrium, the consumer surplus earned by the buyer of the 1st unit is _____.
A) $5.00 B) $15.00 C) $22.50 D) $40.00

Answer: D
Diff: 1
Section: 9.1

2) Refer to Figure 9.1. If the market is in equilibrium, the producer surplus earned by the seller of the 1st unit is _____.
A) $5.00 B) $10.00 C) $15.00 D) $20.00 E) $40.00

Answer: D
Diff: 1
Section: 9.1

3) Refer to Figure 9.1. If the market is in equilibrium, total consumer surplus is
A) $30. B) $70. C) $400. D) $800. E) $1200.

Answer: D
Diff: 2
Section: 9.1

4) Refer to Figure 9.1. If the market is in equilibrium, total producer surplus is
A) $30. B) $70. C) $400. D) $800. E) $1200.

Answer: C
Diff: 2
Section: 9.1

5) Refer to Figure 9.1. If the market is in equilibrium, total consumer and producer surplus is
A) $0. B) $100. C) $800. D) $1200. E) $2000.

Answer: D
Diff: 1
Section: 9.1

6) Refer to Figure 9.1. If the government establishes a price ceiling of $20, how many widgets will be sold?
A) 20 B) 30 C) 40 D) 50 E) 60

Answer: A
Diff: 1
Section: 9.1

7) Refer to Figure 9.1. Suppose the market is currently in equilibrium. If the government establishes a price ceiling of $20, consumer surplus will
A) fall by $200.
B) fall by $300.
C) remain the same.
D) rise by $200.
E) rise by $300.

Answer: C
Diff: 2
Section: 9.1

8) Refer to Figure 9.1. Suppose the market is currently in equilibrium. If the government establishes a price ceiling of $20, producer surplus will
A) fall by $200.
B) fall by $300.
C) remain the same.
D) rise by $200.
E) rise by $300.

Answer: B
Diff: 2
Section: 9.1

9) Refer to Figure 9.1. If the government establishes a price ceiling of $20, the resulting deadweight loss will be
A) $0. B) $20. C) $30. D) $300. E) $600.

Answer: D
Diff: 1
Section: 9.1

10) Refer to Figure 9.1. If the government establishes a price ceiling of $20, total consumer and producer surplus will be
A) $30. B) $400. C) $600. D) $900. E) $1200.

Answer: D
Diff: 1
Section: 9.1

11) Consumer surplus measures
A) the extra amount that a consumer must pay to obtain a marginal unit of a good or service.
B) the excess demand that consumers have when a price ceiling holds prices below their equilibrium.
C) the benefit that consumers receive from a good or service beyond what they pay.
D) gain or loss to consumers from price fixing.

Answer: C
Diff: 1
Section: 9.1

12) When government intervenes in a competitive market by imposing an effective price ceiling, we would expect the quantity supplied to _____ and the quantity demanded to _____.
A) fall; rise B) fall; fall C) rise; rise D) rise; fall

Answer: A
Diff: 1
Section: 9.1

13) Producer surplus is measured as the
A) area under the demand curve above market price.
B) entire area under the supply curve.
C) area under the demand curve above the supply curve.
D) area above the supply curve up to the market price.

Answer: D
Diff: 1
Section: 9.1

14) In an unregulated, competitive market consumer surplus exists because some
A) sellers are willing to take a lower price than the equilibrium price.
B) consumers are willing to pay more than the equilibrium price.
C) sellers will only sell at prices above equilibrium price (or actual price).
D) consumers are willing to make purchases only if the price is below the actual price.

Answer: B
Diff: 1
Section: 9.1

15) In an unregulated, competitive market producer surplus exists because some
A) consumers are willing to pay more than the equilibrium price.
B) producers are willing to take more than the equilibrium price.
C) producers are willing to sell at less than the equilibrium price.
D) consumers are willing to purchase, but only at prices below equilibrium price.

Answer: C
Diff: 1
Section: 9.1

16) Deadweight loss refers to
A) losses in consumer surplus associated with excess government regulations.
B) situations where market prices fail to capture all of the costs and benefits of a policy.
C) net losses in total surplus.
D) losses due to the policies of labor unions.

Answer: C
Diff: 1
Section: 9.1

17) In 1970s the federal government imposed price controls on natural gas. Which of the following statements is true?
A) These price controls caused a chronic excess supply of natural gas.
B) Consumers gained from the price controls, because consumer surplus was larger than it would have been under free market equilibrium.
C) Producers gained from the price controls because producer surplus was larger than it would have been under free market equilibrium.
D) This episode of price controls was unusual, because it resulted in no deadweight loss to society.

Answer: B
Diff: 1
Section: 9.1

18) An effective price ceiling causes a loss of
A) producer surplus for certain and possibly consumer surplus as well.
B) consumer surplus only.
C) producer surplus only.
D) consumer surplus for certain and possibly producer surplus as well.
E) neither producer nor consumer surplus.

Answer: A
Diff: 2
Section: 9.1

19) Price ceilings can result in a net loss in consumer surplus when the _____ curve is _____.
A) demand; very elastic
B) demand; very inelastic
C) supply; very inelastic
D) none of the above; price ceilings always increase consumer surplus

Answer: B
Diff: 2
Section: 9.1

20) Producer surplus for the whole market can be thought of as
A) total profit.
B) variable operating profit plus factor rents.
C) total profit minus factor rents earned by lower cost firms.
D) total profit plus factor rents earned by lower cost firms.

Answer: D
Diff: 2
Section: 9.1

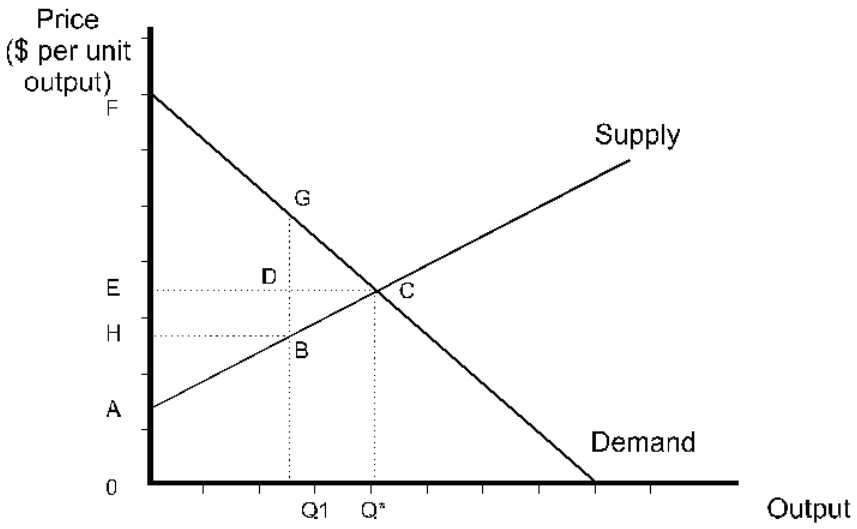


Figure 9.2

21) Refer to Figure 9.2. At price 0E and quantity Q^*, consumer surplus is the area

A) 0FCQ^*.
B) AFC.
C) EFC.
D) AEC.
E) none of the above

Answer: C
Diff: 1
Section: 9.1

22) Refer to Figure 9.2. At price 0E and quantity Q*, producer surplus is the area

A) 0ACQ^*.
B) 0ECQ^*.
C) 0FCQ^*.
D) EFC.
E) none of the above

Answer: E
Diff: 2
Section: 9.1

23) Refer to Figure 9.2. At price 0E and quantity Q*, the deadweight loss is

A) 0ACQ^*.
B) 0ECQ^*.
C) 0FCQ^*.
D) EFC.
E) none of the above

Answer: E
Diff: 2
Section: 9.1

24) Refer to Figure 9.2. At price 0H and quantity Q1, consumer surplus is the area
A) EDGF.
B) 0FGQ1.
C) HFGB.
D) EFC.
E) none of the above

Answer: C
Diff: 2
Section: 9.1

25) Refer to Figure 9.2. At price 0H and quantity Q1, producer surplus is the area
A) 0ABQ1.
B) 0EDQ1.
C) AHB.
D) 0FGQ1.
E) none of the above

Answer: C
Diff: 2
Section: 9.1

26) Refer to Figure 9.2. At price 0H and quantity Q1, the deadweight loss is
A) DGC.
B) BDC.
C) BGC.
D) 0FGQ1.
E) none of the above

Answer: C
Diff: 2
Section: 9.1

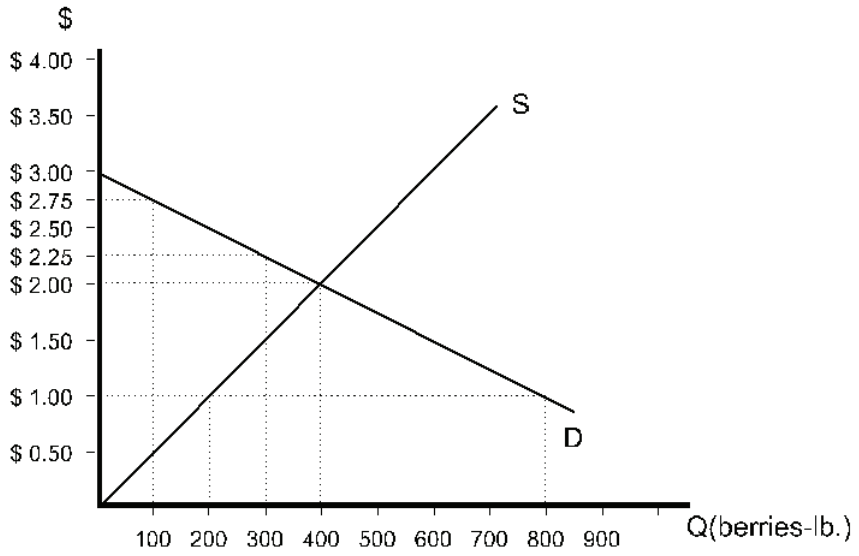


Figure 9.3

27) Refer to Figure 9.3. If the market is in equilibrium, the consumer surplus earned by the buyer of the 100th unit is
A) $0.50. B) $0.75. C) $1.50. D) $2.00. E) $2.75.

Answer: B
Diff: 1
Section: 9.1

28) Refer to Figure 9.3. If the market is in equilibrium, the producer surplus earned by the seller of the 100th unit is
A) $0.50. B) $0.75. C) $1.50. D) $2.00. E) $2.75.

Answer: C
Diff: 1
Section: 9.1

29) Refer to Figure 9.3. If the market is in equilibrium, total consumer surplus is
A) $1. B) $3. C) $200. D) $400. E) $600.

Answer: C
Diff: 2
Section: 9.1

30) Refer to Figure 9.3. If the market is in equilibrium, total producer surplus is
A) $2. B) $3. C) $200. D) $400. E) $600.

Answer: D
Diff: 2
Section: 9.1

31) Refer to Figure 9.3. If the market is in equilibrium, total consumer and producer surplus is
A) $0. B) $4. C) $5. D) $600. E) $800.

Answer: D
Diff: 1
Section: 9.1

32) Refer to Figure 9.3. If the government establishes a price ceiling of $1.00, how many pounds of berries will be sold?
A) 200 B) 300 C) 400 D) 600 E) 800

Answer: A
Diff: 1
Section: 9.1

33) Refer to Figure 9.3. If the government establishes a price ceiling of $1.00, consumer surplus will
A) fall by $50.
B) fall by $150.
C) remain the same.
D) rise by $50.
E) rise by $150.

Answer: E
Diff: 2
Section: 9.1

34) Refer to Figure 9.3. If the government establishes a price ceiling of $1.00, producer surplus will
A) fall by $150.
B) fall by $300.
C) remain the same.
D) rise by $150.
E) rise by $300.

Answer: B
Diff: 2
Section: 9.1

35) Refer to Figure 9.3. If the government establishes a price ceiling of $1.00, the resulting deadweight loss will be
A) $1.50. B) $200. C) $150. D) $300. E) $600.

Answer: C
Diff: 1
Section: 9.1

36) Refer to Figure 9.3. If the government establishes a price ceiling of $1.00, total consumer and producer surplus will be
A) $1.50. B) $300. C) $450. D) $500. E) $600.

Answer: C
Diff: 1
Section: 9.1

37) Price ceilings
A) cause quantity to be higher than in the market equilibrium.
B) always increase consumer surplus.
C) may decrease consumer surplus if demand is sufficiently elastic.
D) may decrease consumer surplus if demand is sufficiently inelastic.
E) always decrease consumer surplus.

Answer: D
Diff: 3
Section: 9.1

38) Consider the following statements when answering this question

I. When a competitive industry's supply curve is perfectly elastic, then the sole beneficiaries of a reduction in input prices are consumers.

II. Even in competitive markets firms have no incentives to control costs, as they can always pass on cost increases to consumers.

A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: B
Diff: 3
Section: 9.1

39) Consider the following statements when answering this question

I. Employers are always hurt by minimum wage laws.

II. Workers always benefit from minimum wage laws.

A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: B
Diff: 3
Section: 9.1

40) Consider the following statements when answering this question

I. Overall, the sick will always gain from a price ceiling on prescription drugs.

II. The reduction of supply caused by the imposition of a price ceiling is greater the more inelastic the market supply curve.

A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: D
Diff: 3
Section: 9.1

41) The consumer's gain from the imposition of a price ceiling is higher when

A) the own price elasticity of market demand is high and the price elasticity of market supply is high.
B) the own price elasticity of market demand is high and the price elasticity of market supply is low.
C) the own price elasticity of market demand is low and the price elasticity of market supply is high.
D) the own price elasticity of market demand is low and the price elasticity of market supply is low.

Answer: D
Diff: 3
Section: 9.1

42) Under a binding price ceiling, what does the change in consumer surplus represent?
A) The gain in surplus for those buyers who can still purchase the product at the lower price.
B) The loss in surplus for those buyers who previously purchased some units of the good at the higher price, but these units are no longer produced at the lower price.
C) The loss in surplus for those buyers who would like the purchase the excess demand created by the price ceiling policy.
D) Both A and B are correct.
E) Both A and C are correct.

Answer: D
Diff: 3
Section: 9.1

43) Under a binding price ceiling, what does the change in producer surplus represent?
A) The gain in surplus for those sellers who are still willing to supply the product at the lower price.
B) The loss in surplus associated with those units that used to be produced at the higher price but are no longer produced at the lower price.
C) The gain in surplus associated with the excess demand created by the price ceiling policy.
D) Both A and B are correct.
E) Both A and C are correct.

Answer: B
Diff: 3
Section: 9.1

44) Governments may successfully intervene in competitive markets in order to achieve economic efficiency
A) at no time; competitive markets are always efficient without government intervention.
B) to increase the incidence of positive externalities.
C) in cases of positive externalities only.
D) in cases of negative externalities only.
E) in cases of both positive and negative externalities.

Answer: E
Diff: 1
Section: 9.2

45) Government intervention can increase total welfare when
A) there are costs or benefits that are external to the market.
B) consumers do not have perfect information about product quality.
C) a high price makes the product unaffordable for most consumers.
D) all of the above
E) A and B only

Answer: E
Diff: 1
Section: 9.2

46) Which of the following policies could lead to a deadweight loss?
A) price ceilings.
B) price floors.
C) policies prohibiting human cloning.
D) all of the above
E) A and B only

Answer: D
Diff: 2
Section: 9.2

47) Having seen the quantity of drugs supplied by pharmaceutical companies in a competitive market, a government decides to force companies to sell exactly the same quantity of drugs at prevailing market prices. The government then forbids additional drug sales and allows doctors to prescribe the drugs at no cost to patients in need. This government scheme is
A) efficient as the quantity of drugs traded is the same as under a free market.
B) efficient as the price of drugs paid by the government is the same as under a free market.
C) efficient as consumer surplus is maximized.
D) likely to be inefficient as doctors are unlikely to prescribe drugs to the consumers who are willing to pay the most for the drugs.
E) likely to be inefficient as drug producers have a captive buyer.

Answer: D
Diff: 3
Section: 9.2

48) For national security reasons a government decides that all of its base metal industry should not be located in the same geographical region, as it presently is. The government decides to allocate production quotas to firms in different parts of the country, but does not restrict in any way the transactions between consumers and base metal producers. This scheme is
A) efficient as consumers still buy from whoever they like.
B) efficient as those consumers who value base metals the most can purchase them.
C) likely to be inefficient as some of the industry's output is not produced by the firms with the lowest cost.
D) likely to be inefficient as the scheme will require subsidies to work.
E) efficient as learning by doing effects will be strongest in the firms set up in new geographical regions.

Answer: C
Diff: 3
Section: 9.2

49) Consider the following statements when answering this question
I. Waiting lists for kidney transplants have been caused by a 1984 congressional law forbidding humans to sell their kidneys.
II. Randomly choosing citizens to serve on juries is an efficient mechanism for selecting jurors.
A) I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) I and II are false.

Answer: B
Diff: 2
Section: 9.2

50) When the market price is held above the competitive level, the deadweight loss is composed of:
A) producer surplus losses associated with units that used to be traded on the market but are no longer exchanged.
B) consumer surplus losses associated with units that used to be traded on the market but are no longer exchanged.
C) producer and consumer surplus losses associated with units that used to be traded on the market but are no longer exchanged.
D) There is no deadweight loss if the government uses a price floor policy to increase the price.

Answer: C
Diff: 2
Section: 9.2

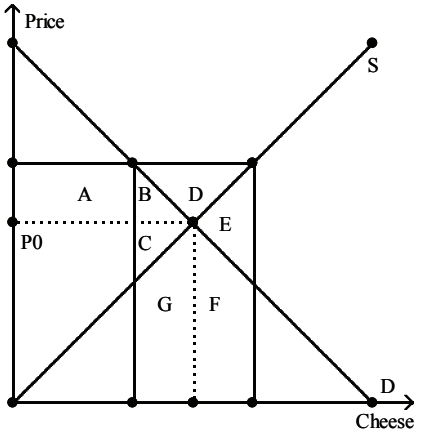
51) A situation in which the unregulated competitive market outcome is inefficient because prices fail to provide proper signals to buyers and sellers is known as:
A) an imperfectly competitive market.
B) a market failure.
C) a deadweight loss.
D) a disequilibrium.

Answer: B
Diff: 1
Section: 9.2

52) Use the following statements to answer this question:
I. When the market price is held above the competitive price level, the loss in consumer surplus is fully captured by producers.
II. When the market price is held above the competitive level, there is no deadweight loss because producer gains exactly equal consumer losses.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: B
Diff: 1
Section: 9.2

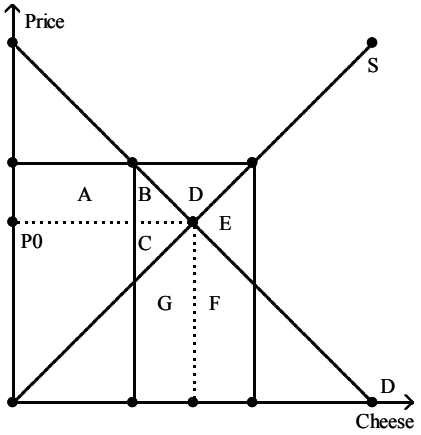
53) Suppose the government raises the price of cheese above the market equilibrium level (P_0) by imposing a high minimum price and purchasing all of the excess supply from the market, and these quantities are destroyed. Based on the areas in the figure below, what is the change in consumer surplus after this policy is adopted?



A) Consumers lose area B.
B) Consumers lose area A+B.
C) Consumers lose area A but gain area B.
D) Consumers gain area A+B.

Answer: B
Diff: 2
Section: 9.4

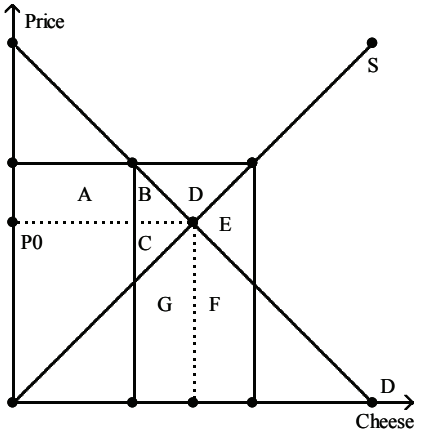
54) Suppose the government raises the price of cheese above the market equilibrium level (P_0) by imposing a high minimum price and purchasing all of the excess supply from the market, and these quantities are destroyed. Based on the areas in the figure below, what is the change in producer surplus after this policy is adopted?



A) Producers lose area C but gain area A.
B) Producers lose area C but gain area A+B.
C) Producers gain A.
D) Producers gain area A+B+D.

Answer: B
Diff: 2
Section: 9.4

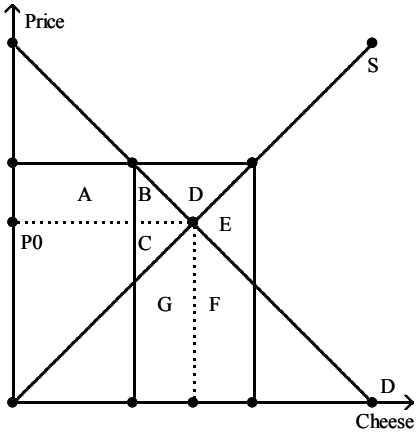
55) Suppose the government raises the price of cheese above the market equilibrium level (P_0) by imposing a high minimum price and purchasing all of the excess supply from the market, and these quantities are destroyed. Based on the areas in the figure below, what is the cost of this program to the government?



A) Government expenditures are area E+F+G.
B) Government expenditures are area B+C+D.
C) Government expenditures are area D.
D) Government expenditures are area B+C+D+E+F+G.

Answer: D
Diff: 3
Section: 9.4

56) Suppose the government raises the price of cheese above the market equilibrium level (P_0) by imposing a high minimum price and purchasing all of the excess supply from the market, and these quantities are destroyed. Based on the areas in the figure below, what is the deadweight loss of this program?



A) Deadweight loss is area E+F+G.
B) Deadweight loss is area B+C+E+F+G.
C) Deadweight loss is area D.
D) Deadweight loss is area B+C+D+E+F+G.

Answer: B
Diff: 3
Section: 9.4

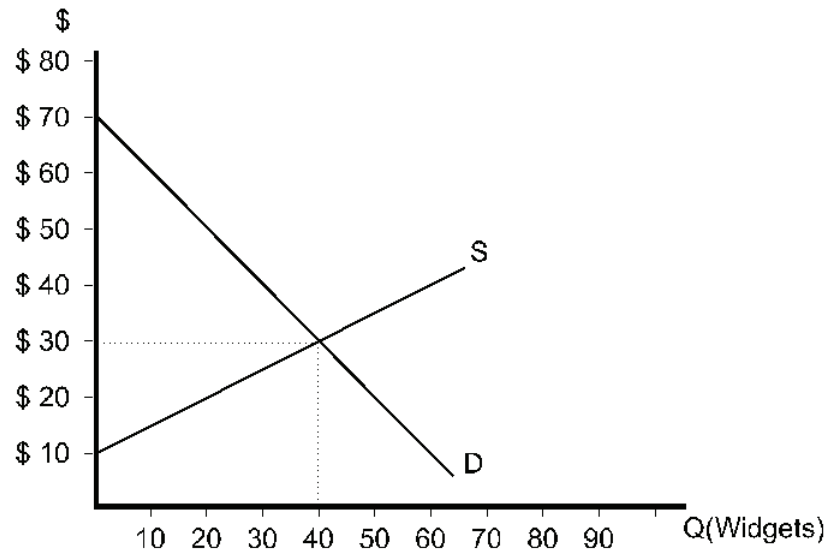


Figure 9.4

57) Suppose the market in Figure 9.4 is currently in equilibrium. If the government establishes a price floor of $50, how many widgets will be sold?
A) 20 B) 30 C) 40 D) 50 E) 60

Answer: A
Diff: 1
Section: 9.3

58) Suppose the market in Figure 9.4 is currently in equilibrium. If the government establishes a price floor of $40, consumer surplus will
A) fall by $50.
B) fall by $350.
C) remain the same.
D) rise by $50.
E) rise by $350.

Answer: B
Diff: 2
Section: 9.3

59) Refer to Figure 9.4. If the government establishes a price floor of $40 and government purchases the surplus over quantity demanded, producer surplus will
A) fall by $275.
B) fall by $500.
C) remain the same.
D) rise by $275.
E) rise by $500.

Answer: E
Diff: 2
Section: 9.3

60) Refer to Figure 9.4. If the government establishes a price floor of $40 and government purchases the surplus over quantity demanded, the resulting deadweight loss will be
A) $15.
B) 10 widgets.
C) $1,050.
D) $1,200.
E) $2,400.

Answer: C
Diff: 1
Section: 9.3

61) Refer to Figure 9.4. If the government establishes a price floor of $40 and purchases the surplus, total consumer and producer surplus will be
A) $15.
B) 30 widgets.
C) $1,050.
D) $1,200.
E) $1,350

Answer: E
Diff: 1
Section: 9.3

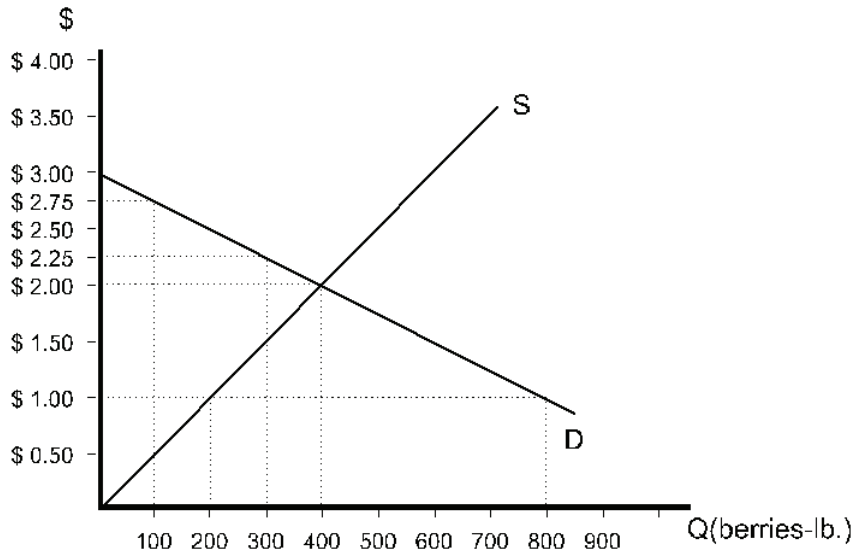


Figure 9.5

62) Refer to Figure 9.5. If the government establishes a price floor of $2.50, how many pounds of berries will be sold?
A) 200 B) 300 C) 400 D) 600 E) 800

Answer: A
Diff: 1
Section: 9.3

63) Refer to Figure 9.5. If the government establishes a price floor of $2.50, consumer surplus will
A) fall by $50.
B) fall by $150.
C) remain the same.
D) rise by $50.
E) rise by $150.

Answer: B
Diff: 2
Section: 9.3

64) Refer to Figure 9.5. If the government establishes a price floor of $2.50 and farmers grow only the amount of berries that will be sold, producer surplus will
A) fall by $50.
B) fall by $100.
C) remain the same.
D) rise by $50.
E) rise by $100.

Answer: C
Diff: 2
Section: 9.3

65) Refer to Figure 9.5. If the government establishes a price floor of $2.50 and farmers grow only the amount of berries that will be sold, the resulting deadweight loss will be
A) $1.50.
B) 200 pounds of berries.
C) $150.
D) $250.
E) $300.

Answer: C
Diff: 1
Section: 9.3

66) Refer to Figure 9.5. If the government establishes a price floor of $2.50 and farmers grow only the amount of berries that will be sold, total consumer and producer surplus will be
A) $1.50. B) $300. C) $450. D) $500. E) $600.

Answer: C
Diff: 1
Section: 9.3

67) Which of the following is NOT true about price floors?
A) Consumer surplus is always lower than it would be in the competitive equilibrium.
B) Producer surplus could be lower, higher, or the same as it would be in competitive equilibrium.
C) Producer surplus could be negative as the result of a price floor.
D) Producers will often respond to a price floor by cutting production to the point at which price equals marginal cost.
E) The total producer surplus depends on how producers respond to the price floor in determining their output level.

Answer: D
Diff: 2
Section: 9.3

68) Eliminating price supports for all US agricultural producers will hurt the farmers who cultivate products that have
A) a high own price elasticity of demand and a high price elasticity of market supply.
B) a high own price elasticity of demand and a low price elasticity of market supply.
C) a low own price elasticity of demand and a high price elasticity of market supply.
D) a low own price elasticity of demand and a low price elasticity of market supply.

Answer: D
Diff: 3
Section: 9.3

69) One way to remove the excess labor supply problem from a minimum wage policy is to have the government hire all unemployed workers at the minimum wage. What is the key drawback of this version of a minimum wage policy?
A) The deadweight loss may increase substantially.
B) The cost to the government may be very large.
C) Consumer surplus losses increase further.
D) A and B are correct.
E) B and C are correct..

Answer: D
Diff: 2
Section: 9.3

70) A minimum wage policy induces an:
A) excess demand for labor.
B) excess supply of labor.
C) efficient market outcome.
D) elastic labor supply response.

Answer: B
Diff: 1
Section: 9.3

71) What is the difference between a price support and a price floor?
A) A price support is below equilibrium; a price floor is above it.
B) A price support is above equilibrium; a price floor is below it.
C) Government buys the excess supply to maintain a price floor, but not a price support.
D) Government buys the excess supply to maintain a price support, but not for a price floor.
E) There is no difference between the two.

Answer: D
Diff: 1
Section: 9.4

72) A price support may be pictured by
A) shifting the demand curve to the right by the amount of the government purchase.
B) shifting the demand curve to the left by the amount of the government purchase.
C) shifting the supply curve to the right by the amount of the government purchase.
D) shifting the supply curve to the left by the amount of the government purchase.
E) drawing a horizontal line below equilibrium price at the supported price.

Answer: A
Diff: 1
Section: 9.4

73) Which of the following is unlikely to occur as a result of a price support program?
A) A reduction in consumer surplus
B) A reduction in producer surplus
C) An increase in quantity purchased
D) An economic cost to government
E) Improved economic efficiency

Answer: B
Diff: 1
Section: 9.4

74) A country's government would like to raise the price of one its most important agricultural crops, coffee beans. Which of the following government programs will result in higher prices for coffee beans?
A) An import quota on coffee beans
B) An acreage limitation program which provides coffee bean farmers financial incentives to leave some of their acreage idle
C) An import tariff on coffee beans
D) all of the above

Answer: D
Diff: 1
Section: 9.4

75) When the federal government installs a price support program that requires the government to purchase all of a good not bought in the private economy at the support price, changes in producer surplus
A) are negative.
B) are positive, but more than offset by the cost to consumers and the government.
C) are positive, and not offset by the cost to consumers and the government.
D) and consumer surplus are both positive.

Answer: B
Diff: 2
Section: 9.4

76) When the federal government installs a price support program that requires the government to purchase all of a good not bought in the private economy at the support price, the impact on total welfare is the
A) change in consumer surplus.
B) change in consumer surplus + the change in producer surplus + the cost to government.
C) change in consumer surplus + the change in producer surplus – the cost to government.
D) change in consumer surplus + the change in producer surplus.

Answer: C
Diff: 1
Section: 9.4

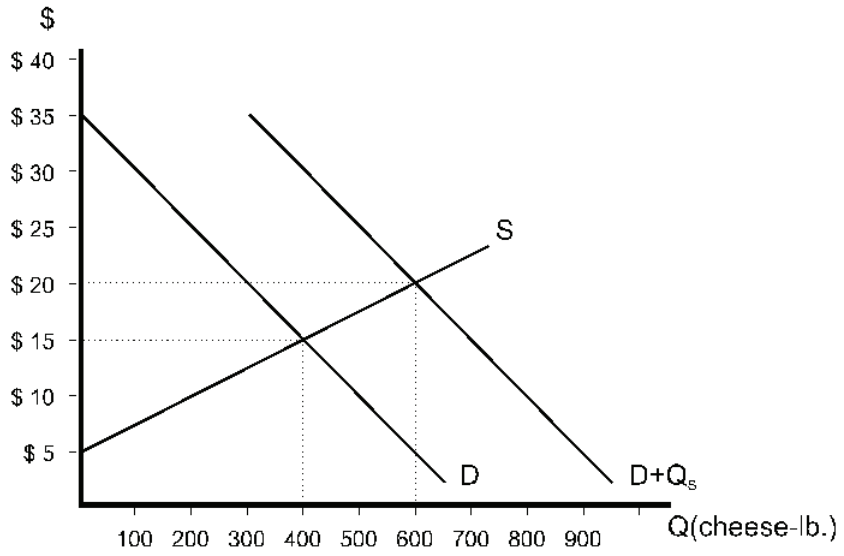


Figure 9.6

77) Refer to Figure 9.6. The government policy pictured is
A) a price ceiling of $20.
B) a price support of $20.
C) a price ceiling of $15.
D) a price support of $15.
E) A quota of 600.

Answer: B
Diff: 1
Section: 9.4

78) Refer to Figure 9.6. Before this policy was implemented, consumer surplus was
A) $20. B) $4000. C) $6000. D) $8000. E) $12000.

Answer: B
Diff: 2
Section: 9.4

79) Refer to Figure 9.6. Before this policy was implemented, producer surplus was
A) $10. B) $2000. C) $4000. D) $6000. E) $12000.

Answer: B
Diff: 2
Section: 9.4

80) Refer to Figure 9.6. As a result of this policy, quantity will
A) fall to 300.
B) rise to 400.
C) stay at 400.
D) fall to 400.
E) rise to 600.

Answer: E
Diff: 1
Section: 9.4

81) Refer to Figure 9.6. As a result of this policy, consumer surplus will
A) fall to $15.
B) fall to $2250.
C) rise to $2500.
D) fall to $5000.
E) rise to $5000.

Answer: B
Diff: 2
Section: 9.4

82) Refer to Figure 9.6. As a result of this policy, producer surplus will be
A) $2000. B) $3375. C) $4500. D) $6000. E) $12,000.

Answer: C
Diff: 2
Section: 9.4

83) Refer to Figure 9.6. The amount the government pays in the market to implement this policy is
A) $20. B) $3000. C) $4000. D) $6000. E) $12,000.

Answer: D
Diff: 2
Section: 9.4

84) Refer to Figure 9.6. Including the consumers' expected tax burden, the total change in welfare from this policy is
A) –$6000. B) –$5250. C) –$4500. D) $4500. E) $5250.

Answer: B
Diff: 2
Section: 9.4

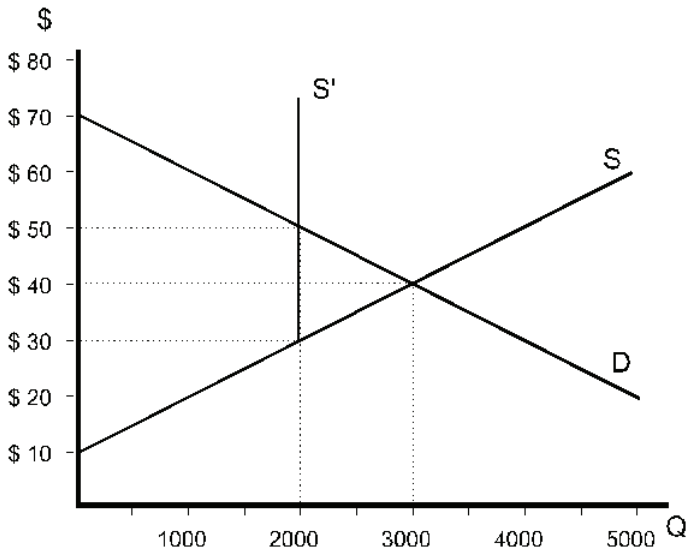


Figure 9.7

85) The policy shown in Figure 9.7 is a
A) price floor of $50.
B) price support of $50.
C) price ceiling of $30.
D) quota of 2000.
E) quota of 4000.

Answer: D
Diff: 1
Section: 9.4

86) Refer to Figure 9.7. Before the policy was implemented, consumer surplus was
A) $30. B) $60. C) $45,000. D) $90,000. E) $180,000.

Answer: C
Diff: 2
Section: 9.4

87) Refer to Figure 9.7. Before the policy was implemented, producer surplus was
A) $30. B) $60. C) $45,000. D) $90,000. E) $180,000.

Answer: C
Diff: 2
Section: 9.4

88) Refer to Figure 9.7. After the policy was implemented, the quantity traded became
A) 1000.
B) 2000.
C) 3000.
D) 4000.
E) between 2000 and 4000, but the amount depends upon producers' reactions, which are uncertain.

Answer: B
Diff: 1
Section: 9.4

89) Refer to Figure 9.7. After the policy was implemented, price became
A) $10.
B) $30.
C) $50.
D) $70.
E) between $50 and $70, but the price is uncertain because quantity can be any amount between 2000 and 4000.

Answer: C
Diff: 1
Section: 9.4

90) Refer to Figure 9.7. After the policy, consumer surplus became
A) $0. B) $10. C) $20. D) $20,000. E) $40,000.

Answer: D
Diff: 2
Section: 9.4

91) Refer to Figure 9.7. Because of the policy, consumer surplus fell by
A) $10. B) $20. C) $12,500. D) $25,000. E) $45,000.

Answer: D
Diff: 1
Section: 9.4

92) Refer to Figure 9.7. Without counting any government payments received by firms, as a result of this policy the producer surplus earned on the units sold in the market
A) rose by $15,000.
B) rose by $20,000.
C) rose by $40,000.
D) fell by $5,000.
E) fell by $45,000.

Answer: A
Diff: 2
Section: 9.4

93) Refer to Figure 9.7. The amount the government will have to pay to producers to sustain this policy is at least
A) $0. B) $10,000. C) $15,000. D) $20,000. E) $100,000.

Answer: D
Diff: 2
Section: 9.4

94) Refer to Figure 9.7. Because of this policy, total producer surplus including funds received from the government will be at least
A) $10,000. B) $40,000. C) $80,000. D) $100,000. E) $160,000.

Answer: C
Diff: 2
Section: 9.4

95) As illustrated in the textbook, the government can further increase the support price of a commodity by purchasing excess supplies and using a:
A) production quota. B) consumption tax.
C) excess profits tax. D) minimum wage.

Answer: A
Diff: 1
Section: 9.4

96) A small decrease in a production quota will have a large impact on the support price if:
A) demand is completely elastic.
B) demand is highly (but not completely) elastic.
C) demand is inelastic.
D) The demand elasticity does not affect the price outcomes of a quota program.

Answer: C
Diff: 2
Section: 9.4

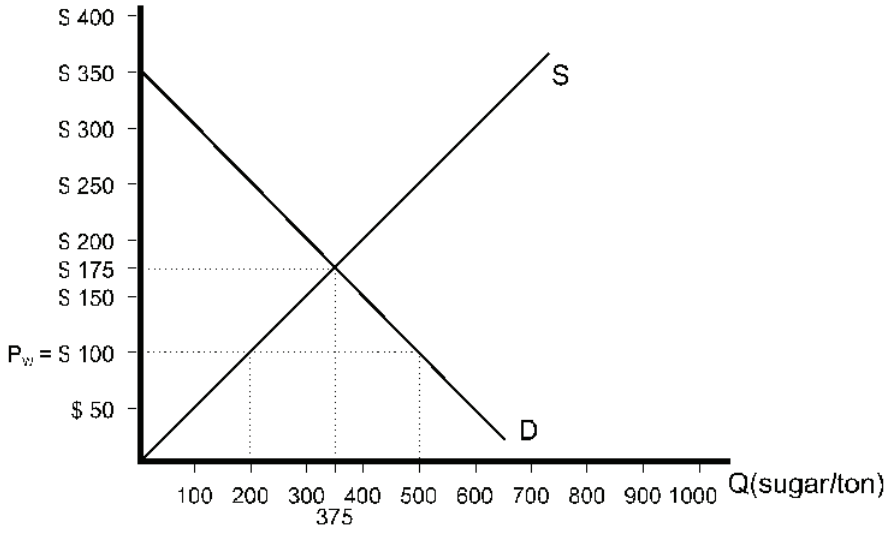


Figure 9.8

97) Refer to Figure 9.8. With no government interference, the country pictured will
A) import 500 tons of sugar.
B) import 300 tons of sugar.
C) import 200 tons of sugar.
D) import no sugar.
E) export sugar.

Answer: B
Diff: 1
Section: 9.5

98) Refer to Figure 9.8. In order to eliminate international trade in sugar altogether, this country would have to impose a tariff of
A) $25. B) $50. C) $75. D) $150. E) $175.

Answer: C
Diff: 2
Section: 9.5

99) Refer to Figure 9.8. In order to eliminate international trade in sugar altogether, this country would have to impose a quota of
A) 0 tons. B) 200 tons. C) 300 tons. D) 350 tons. E) 500 tons.

Answer: A
Diff: 2
Section: 9.5

100) Refer to Figure 9.8. A $50 tariff would result in domestic consumption of
A) 600, domestic production of 100, and imports of 500.
B) 500, domestic production of 200, and imports of 300.
C) 400, domestic production of 300, and imports of 100.
D) 300, domestic production of 400, and exports of 100.
E) 200, domestic production of 500, and exports of 300.

Answer: C
Diff: 2
Section: 9.5

101) Refer to Figure 9.8. If free trade in sugar is allowed, consumer surplus will be
A) $175. B) $250. C) $30,625. D) $61,250. E) $62,500.

Answer: E
Diff: 2
Section: 9.5

102) Refer to Figure 9.8. If free trade in sugar is replaced by a $50 tariff in sugar, consumer surplus will
A) fall by $50.
B) fall by $26,250.
C) fall by $22,500.
D) rise by $50.
E) rise by $17,500.

Answer: C
Diff: 2
Section: 9.5

103) Refer to Figure 9.8. Under free trade in sugar, domestic producer surplus will be
A) $100. B) $175. C) $10,000. D) $25,000. E) $30,625.

Answer: C
Diff: 2
Section: 9.5

104) Refer to Figure 9.8. If free trade in sugar is replaced by a $50 tariff on sugar, the effect on domestic producer surplus will be to
A) lower it by $50.
B) lower it by $12,500.
C) leave it unchanged.
D) raise it by $50.
E) raise it by $12,500.

Answer: E
Diff: 2
Section: 9.5

105) Refer to Figure 9.8. If free trade in sugar is replaced by a $50 tariff in sugar, government revenue from the tariff will be
A) $50. B) $5000. C) $15,000. D) $17,500. E) $25,000.

Answer: B
Diff: 2
Section: 9.5

106) Refer to Figure 9.8. In order to gain the equivalent imports as a $50 tariff, the government would have to impose a quota of
A) 100 tons of sugar.
B) 200 tons of sugar.
C) 300 tons of sugar.
D) 350 tons of sugar.
E) 500 tons of sugar.

Answer: A
Diff: 2
Section: 9.5

107) Import tariffs generally result in
A) higher domestic prices.
B) less consumer surplus.
C) more producer surplus for domestic producers.
D) a deadweight loss.
E) all of the above

Answer: E
Diff: 1
Section: 9.5

108) Compared to a tariff, an import quota, which restricts imports to the same amount as the tariff, will leave the country as a whole
A) worse off than a comparable tariff. B) not as bad off as a comparable tariff.
C) about the same as a comparable tariff. D) Any of the above can be true.

Answer: A
Diff: 2
Section: 9.5

109) Although rice is a staple of the Japanese diet, the Japanese government has long restricted the importation of rice into Japan. The result of this import quota is:
A) to decrease the price of rice to the Japanese people.
B) to decrease the consumer surplus of Japanese rice consumers.
C) to decrease the producer surplus of Japanese rice producers.
D) a welfare gain for the Japanese people.
E) to increase the consumption of rice by the Japanese people.

Answer: B
Diff: 2
Section: 9.5

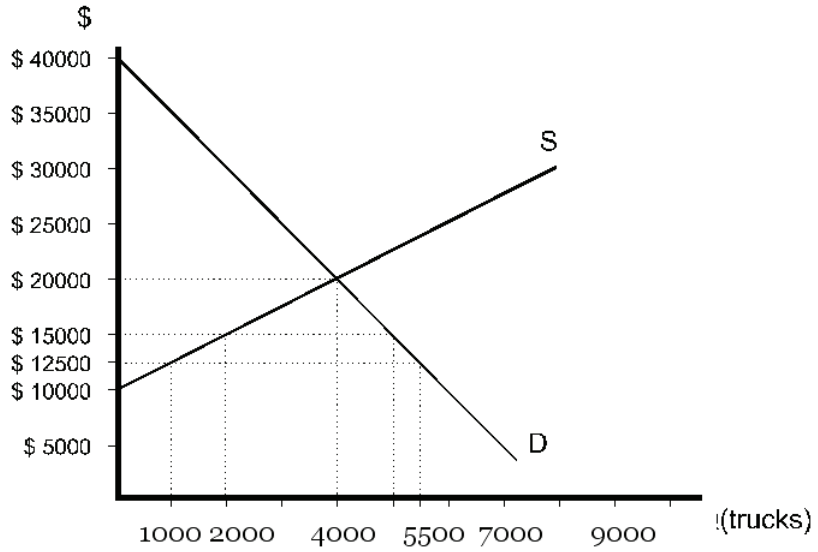


Figure 9.9

110) Refer to Figure 9.9. At free trade, domestic consumer surplus would be
A) $20,000.
B) $27,500.
C) $40,000,000.
D) $45,000,000.
E) $75,625,000.

Answer: E
Diff: 2
Section: 9.5

111) Refer to Figure 9.9. At free trade, domestic producer surplus would be
A) $2,500.
B) $50,000.
C) $1,250,000.
D) $2,500,000.
E) $20,000,000.

Answer: C
Diff: 2
Section: 9.5

112) Refer to Figure 9.9. At free trade, domestic consumption is
A) 5500; domestic production is 1000; imports are 4500.
B) 5000; domestic production is 2000; imports are 3000.
C) 4000; domestic production is 4000; imports are 0.
D) 2000; domestic production is 5000; imports are 3000.
E) 1000; domestic production is 5500; imports are 4500.

Answer: A
Diff: 1
Section: 9.5

113) Refer to Figure 9.9. Now suppose an import quota of 3000 trucks is imposed. The quota will make total consumer surplus equal to
A) $25,000.
B) $13,125,000.
C) $40,000,000.
D) $62,500,000.
E) $75,625,000.

Answer: D
Diff: 2
Section: 9.5

114) Refer to Figure 9.9. Now suppose an import quota of 3000 trucks is imposed. The quota will make total domestic producer surplus equal to
A) $2,500.
B) $5,000.
C) $5,000,000.
D) $10,000,000.
E) $30,000,000.

Answer: C
Diff: 2
Section: 9.5

115) Refer to Figure 9.9. Now suppose an import quota of 3000 trucks is imposed. Government revenue from the quota will be
A) $0.
B) $2,500.
C) $7,500,000.
D) $12,500,000.
E) $13,125,000.

Answer: A
Diff: 1
Section: 9.5

116) Refer to Figure 9.9. Now suppose an import quota of 3000 trucks is imposed. The quota will decrease the revenue of foreign firms by
A) $0.
B) $2,500.
C) $7,500,000.
D) $11,250,000.
E) $13,125,000.

Answer: D
Diff: 2
Section: 9.5

117) Refer to Figure 9.9. Now suppose an import quota of 3000 trucks is imposed. An alternative to the quota that would have the same impact on the number of imports would be a tariff of
A) $2,500.
B) $5,000.
C) $15,000.
D) $20,000.
E) $13,125,000.

Answer: A
Diff: 2
Section: 9.5

118) Refer to Figure 9.9. Now suppose an import quota of 3000 trucks is imposed. If the government wanted to cut off all international trade without changing the quota, it could allow the quota amount of 3000 trucks in at no tariff and then charge a tariff on all imports above the quota amount. What tariff would accomplish the goal?
A) $0. B) $5,000 C) $7,500 D) $10,000 E) $20,000

Answer: B
Diff: 2
Section: 9.5

119) The U.S. government currently imposes a $0.54 per gallon tariff on all ethanol imported into the country. If this tariff were removed, then:
A) the domestic ethanol price falls.
B) foreign producer surplus declines.
C) domestic consumer surplus increases.
D) domestic producer surplus decreases.
E) all of the above

Answer: E
Diff: 2
Section: 9.5

120) In general, the deadweight loss associated with an import tariff or quota becomes relatively larger when:
A) supply and demand are inelastic.
B) supply is elastic and demand is inelastic.
C) demand is elastic and supply is inelastic.
D) supply and demand are elastic.

Answer: D
Diff: 2
Section: 9.5

121) As noted in the text, the major Japanese auto manufacturers agreed to "voluntary" import restrictions that reduced the number of cars they could ship to the U.S. market in the 1980s. One of the key outcomes from this policy is that the Japanese manufacturers were able to:
A) focus on more profitable auto markets in other countries.
B) raise their prices of autos in the U.S. market and capture higher profit margins on the imported cars.
C) cut their costs by more than the import tariff, so profit per auto increased.
D) all of the above

Answer: B
Diff: 2
Section: 9.5

122) Where Es is the elasticity of supply and Ed is the own price elasticity of demand, the fraction of the tax passed on to consumers in the form of higher prices is
A) Es/(Es–Ed).
B) Ed/(Es–Ed).
C) Es/(Ed–Es).
D) Ed/(Ed–Es).
E) Ed/Es.

Answer: A
Diff: 1
Section: 9.6

123) The benefit of a subsidy accrues mostly to consumers
A) in every instance.
B) if Ed/Es is large.
C) if Ed/Es is small.
D) if Ed and Es are equal.
E) in no instance.

Answer: C
Diff: 2
Section: 9.6

124) Which of the following conditions must hold in the equilibrium of a competitive market where the government puts a specific tax on consumers?
A) The quantity sold and the price paid by the buyer must lie on the demand curve.
B) The quantity sold and the seller's price must lie on the supply curve.
C) The quantity demanded must equal the quantity supplied.
D) the difference between the price the buyer pays and the price the seller receives must equal the specific tax.
E) all of the above

Answer: E
Diff: 3
Section: 9.6

125) Consider the following statements when answering this question
I. It is impossible to shift taxes from producers to consumers without hurting the latter.
II. Only polluters pay (through production taxes) for the environmental damage they cause.
A) I and II are true. B) I is true, and II is false.
C) I is false, and II is true. D) I and II are false.

Answer: D
Diff: 3
Section: 9.6

126) The formula $E_S/(E_S - E_d)$ is used to calculate the
A) deadweight loss from price support programs.
B) increase in consumer surplus from a price ceiling.
C) fraction of a specific tax that is passed through to consumers.
D) none of the above

Answer: C
Diff: 1
Section: 9.6

127) In 1994, the state of California suffered a devastating earthquake. To help pay for the damages, the state raised its sales tax by one cent per dollar of expenditure on most consumer goods. This state sales tax is an example of what economists call:
A) an ad valorem tax.
B) a specific tax.
C) a neutral tax.
D) a negative tax.
E) none of the above

Answer: A
Diff: 1
Section: 9.6

128) The Clinton administration has recommended an increase in the tax on yachts to help pay for government programs. Which of the following is true?
A) The burden of this tax will fall entirely on yacht consumers.
B) The burden of this tax will fall entirely on yacht manufacturers.
C) The sales of yachts will decrease.
D) The profit of yacht manufacturers will increase.
E) Employment of workers in the yacht industry will increase.

Answer: C
Diff: 1
Section: 9.6

129) Consider a good whose own price elasticity of demand is 0 and price elasticity of supply is 1. The fraction of a specific tax that will be passed through to consumers is _____.
A) 0 B) 0.25 C) 0.5 D) 0.75 E) 1

Answer: E
Diff: 2
Section: 9.6

130) Consider a good whose own price elasticity of demand is –0.5 and price elasticity of supply is 1.5. The fraction of a specific tax that will be passed through to consumers is _____.
A) 0 B) 0.25 C) 0.5 D) 0.75 E) 1

Answer: D
Diff: 2
Section: 9.6

131) Consider a good whose own price elasticity of demand is –1.5 and price elasticity of supply is 0.5. The fraction of a specific tax that is borne by producers is _____.
A) 0 B) 0.25 C) 0.5 D) 0.75 E) 1

Answer: D
Diff: 2
Section: 9.6

132) The price elasticity of demand is –1.5. The price elasticity of supply is 1.5. The fraction of a specific tax that is borne by producers is _____.
A) 0 B) 0.25 C) 0.5 D) 0.75 E) 1

Answer: C
Diff: 2
Section: 9.6

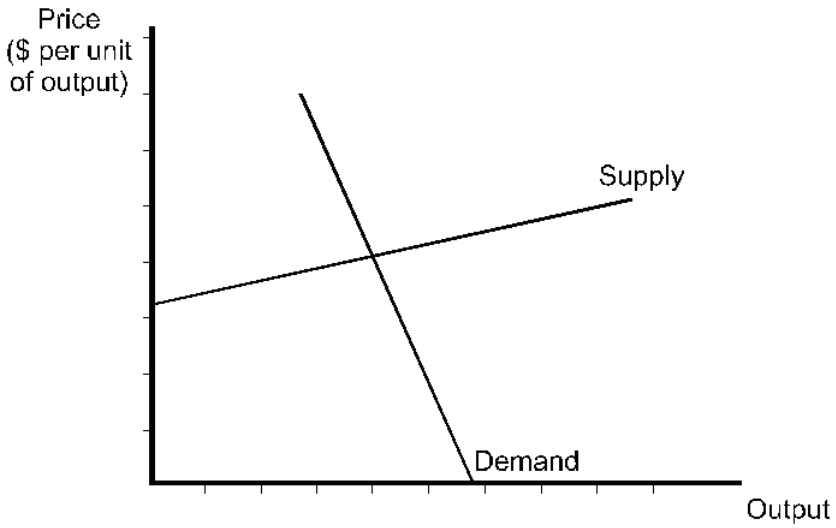
133) When the government imposes a specific tax per unit on a product, changes in consumer surplus are _____ and changes in producer surplus are _____.
A) negative; positive B) positive; positive
C) negative; negative D) positive; negative

Answer: C
Diff: 2
Section: 9.6

134) The burden of a tax per unit of output will fall heavily on consumers when demand is relatively _____ and supply is relatively _____.
A) inelastic; elastic B) inelastic; inelastic
C) elastic; elastic D) elastic; inelastic

Answer: A
Diff: 2
Section: 9.6

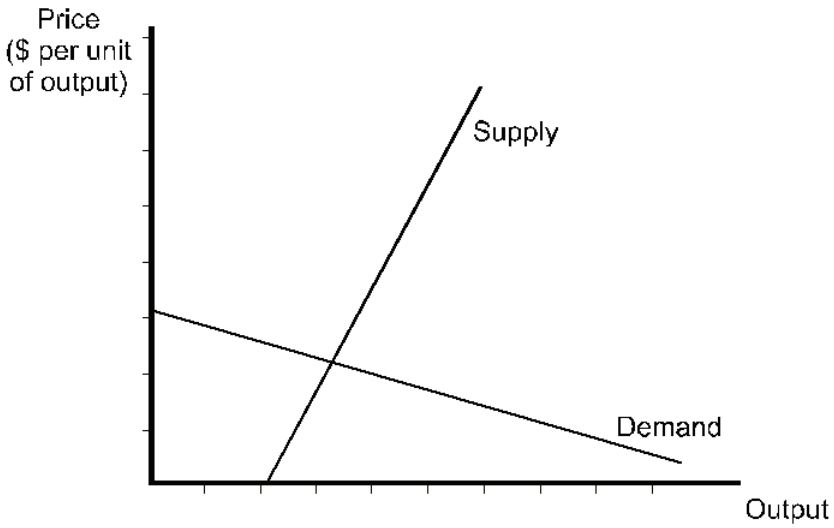
135) A specific tax will be imposed on a good. The supply and demand curves for the good are shown in the diagram below. Given this information, the burden of the tax:



A) is shared about evenly between consumers and producers.
B) falls mostly on consumers.
C) falls mostly on producers.
D) cannot be determined without more information on the price elasticities of supply and demand.

Answer: B
Diff: 2
Section: 9.6

136) A specific tax will be imposed on a good. The supply and demand curves for the good are shown in the diagram below. Given this information, the burden of the tax:



A) is shared about evenly between consumers and producers.
B) falls mostly on consumers.
C) falls mostly on producers.
D) cannot be determined without more information on the price elasticities of supply and demand.

Answer: C
Diff: 2
Section: 9.6

137) The deadweight loss of a specific tax will be a small share of the tax revenue collected if:
A) supply is more inelastic than demand.
B) demand is more inelastic than supply.
C) supply and demand are both elastic.
D) supply and demand are both inelastic.

Answer: D
Diff: 2
Section: 9.6

138) A few years ago, the city of Seattle, Washington, considered imposing a specific tax on all espresso-based coffee drinks sold in the city. The extra tax revenue generated would have been used to fund after-school programs for low-income children. The coffee-house owners (firms) agreed that this would be a good program to fund, but they argued that the tax would sharply reduce their sales volume and they would pay most of the tax burden. This claim is true if:
A) the demand for espresso-based coffee is more inelastic than supply.
B) the demand for espresso-based coffee is more elastic than supply.
C) there are no close substitutes for espresso-based coffee drinks.
D) espresso-based coffee drinks can be produced at constant marginal cost.

Answer: B
Diff: 3
Section: 9.6

139) Use the following statements to answer this question:

I. For downward sloping demand and upward sloping supply curves, the government expenditure used to pay for a subsidy program exceeds the sum of the changes in producer and consumer surplus.

II. To model the price–quantity impacts of a subsidy, we can shift the demand curve upward by the amount of the per–unit subsidy payment.

A) I and II are true. B) I is true and II is false.

C) II is true and I is false. D) I and II are false.

Answer: A

Diff: 3

Section: 9.6

140) The utilities commission in a city is currently examining pay telephone service in the city. The commission has been asked to evaluate a proposal by a city council member to place a $0.10 price ceiling on local pay phone service. The staff economist at the utilities commission estimates the demand and supply curves for pay telephone service as follows:

$Q_D = 1600 - 2400P$

$Q_S = 200 + 3200P$,

where P = price of a pay telephone call, and Q = number of pay telephone calls per month.

a. Determine the equilibrium price and quantity that will prevail without the price ceiling.

b. Analyze the quantity that will be available with the price ceiling (in the long–run).

c. The city council realizes that the telephone company could curtail pay phone service in response to the ceiling. To prevent this, the council plans to impose a requirement that the telephone company must maintain the current number of pay phones. In light of this additional restriction, what will be the likely impact of the price ceiling?

Answer: ***a.***

set $Q_D = Q_S$

$1600 - 2400P = 200 + 3200P$

$1400 = 5600P$

$P = \$0.25$

substitute into Q_D

$Q_D = 1600 - 2400(0.25)$

$Q_D = 1000$

b.

$Q_S = 200 + 3200(0.10)$

$Q_S = 520$

$Q_D = 1600 - 2400(0.10)$

$Q_D = 1360$

There will be a shortage of 1360 – 520 or 840 calls.

c.

The telephone company would be expected to allow service to decline by not servicing broken phones, placing the required phones in very easily reserviced areas, and otherwise reducing the cost of complying with the requirement.

Diff: 2

Section: 9.1

141) In an unregulated, competitive market we could calculate consumer surplus if we knew the equations representing supply and demand. For this problem assume that supply and demand are as follows:

Supply $P = 4 + 0.116Q$

Demand $P = 25 - 0.10Q$,

where P represents unit price in dollars and Q represents number of units sold each year. Calculate the annual value of aggregate consumer surplus.

Answer: We must calculate the area above the equilibrium price and below the demand curve. The equilibrium price is:

$$4 + 0.116Q = 25 - 0.10Q$$
$$0.216Q = 21$$
$$Q = 97.22 \text{ units per year.}$$

The area below the demand curve can be calculated after we know the height of demand at $Q = 0$ and $Q = 97.22$.

At $Q = 0$, $P = 25$.

At $Q = 97.22$, $P = 25 - 0.10(97.22) = 15.28$.

Since demand is linear, we can use the difference of 25 and 15.28 or 9.72 as the height of the space under demand.

$$\text{Area} = 1/2\ b \cdot h = (1/2)(97.22)(9.72) = \$472.49$$

Diff: 1
Section: 9.1

142) The elected officials in a west coast university town are concerned about the "exploitative" rents being charged to college students. The town council is contemplating the imposition of a $350 per month rent ceiling on apartments in the city. An economist at the university estimates the demand and supply curves as:

$Q_D = 5600 - 8P \quad Q_S = 500 + 4P,$

where P = monthly rent, and Q = number of apartments available for rent. For purposes of this analysis, apartments can be treated as identical.

a. Calculate the equilibrium price and quantity that would prevail without the price ceiling. Calculate producer and consumer surplus at this equilibrium (sketch a diagram showing both).

b. What quantity will eventually be available if the rent ceiling is imposed? Calculate any gains or losses in consumer and/or producer surplus.

c. Does the proposed rent ceiling result in net welfare gains? Would you advise the town council to implement the policy?

Answer: ***a.***

To calculate equilibrium set $Q_D = Q_S$ and solve for P.

$5600 - 8P = 500 + 4P$

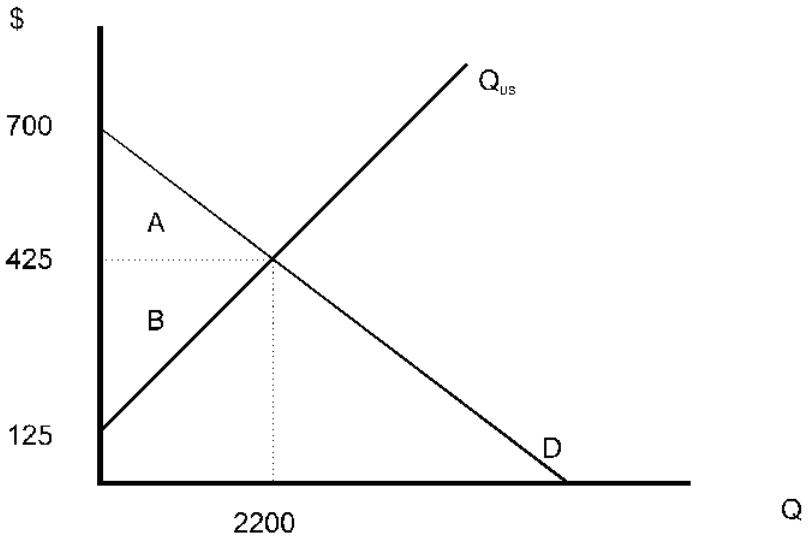
$5100 = 12P$

$P = 425$

Substitute P into Q_D to solve for Q

$Q_D = 5600 - 8(425)$

$Q = 2200$



$Q_D = 5600 - 8P$

$P = 700 - 0.125Q_D$

$Q_S = 500 - 4P$

$P = 125 + 0.25Q$

C.S. = area A

C.S. = $0.5(700 - 425) \times 2200$

C.S. = 302,500

P.S. = area B

P.S. = 0.5(425 – 125) × 2200
P.S. = 330,000
Sum of producer and consumer surplus is:
302,500 + 330,000 = 632,500

b.

Eventually the market will settle at the quantity supplied corresponding to $350 rent.

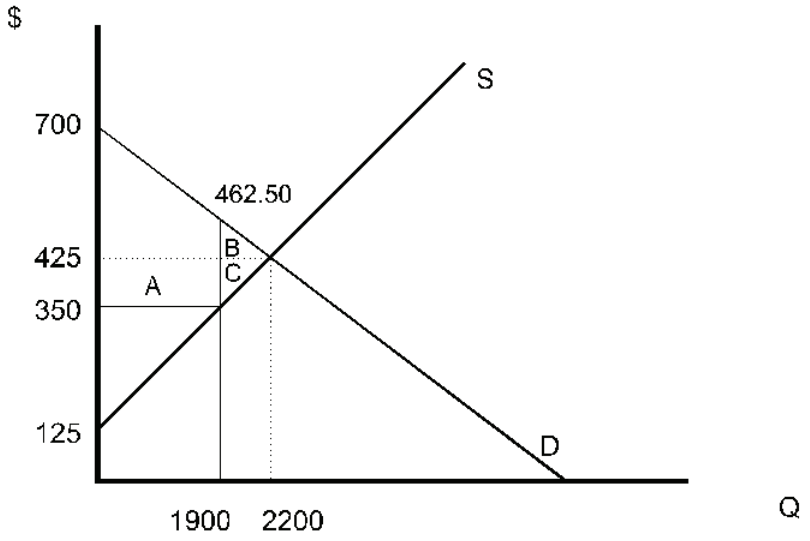
$Q_S = 500 + 4(350)$

$Q_S = 1900$

Q_D at P = 350

$Q_D = 5600 - 8(350) = 2800$

There will be a shortage of 900 apartments.



Gain = Consumer surplus is area A
Area A = (425 – 350) × 1900 = 142,500

Area B = loss in consumer surplus
To find area B, first find consumer reservation price corresponding to an output of 1900.

P = 700 – 0.125(1900) = 462.50

Difference Q = 2200 – 1900 = 300

Area B = 0.5(462.50 – 425) × (2200 – 1900)
Area B = 5625

Loss in consumer surplus is 5625.

Area C is loss in producer surplus not offset by gain in consumer surplus.

Area C = 0.5(425 – 350) × (2200 – 1900)
Area C = 11,250

c.

Area A is a gain in consumer surplus, but it is offset by a loss in producer surplus. The net changes are thus B (lost C.S.) and C (lost P.S.). The policy thus results in a deadweight loss.The deadweight loss = lost C.S. + lost P.S. or 5625 + 11250 = 16,875.

Deadweight loss = 16,875

Diff: 2
Section: 9.1

143) In an unregulated competitive market, supply and demand have been estimated as follows:
Demand P = 25 0.10Q Supply P = 4 + 0.116Q,
where P represents unit price in dollars, and Q represents number of units sold per year.

a. Calculate annual aggregate consumer surplus.
b. Calculate annual aggregate producer surplus.
c. Define what producer surplus means.

Answer: ***a.***

First compute equilibrium price.

$Q_S = Q_D$
$4 + 0.116Q = 25 - 0.10Q$
$0.216Q = 21$
$Q = 97.22$ units per year
At $Q = 97.22$, $P = 25 - 0.10(97.22) = 15.28$.

Consumer surplus is the area of the triangle between the equilibrium price line 15.28 and the demand curve out to Q = 97.22
Height of triangle is 25 – 15.28 = 9.72
Area = (1/2)(b)(h) = (0.5)(97.22)(9.72) = $472.49
Consumer surplus = $472.49 per year.

b.

The producer surplus is the area of the triangle formed by the area bounded by the equilibrium price line and the supply curve.

Height of triangle is = 15.28 – 4 (S at Q = 0). = 11.28
Area of triangle = 1/2 b • h = (0.5)(97.22)(11.28) = $548.21 per year.

c.

Producer surplus represents the value of payments per unit of time to sellers over and above the marginal cost of producing the units. For the individual unit, it is the difference between the equilibrium price and the marginal cost of producing the unit.

Diff: 2
Section: 9.1

144) In a competitive market, the following supply and demand equations are given:

Supply $P = 5 + 0.36Q$

Demand $P = 100 - 0.04Q$,

where P represents price per unit in dollars, and Q represents rate of sales in units per year.

a. Determine the equilibrium price and sales rate.

b. Determine the deadweight loss that would result if the government were to impose a price ceiling of 40 dollars per unit.

Answer: ***a.***

Equate supply and demand to get equilibrium values.

$5 + 0.036Q = 100 - 0.04Q$

$0.076Q = 95$

$Q = 1{,}250$ units per year

The equilibrium price is

$P = 5 + 0.036(1250) = \$50.00$ per unit.

b.

With a price ceiling of \$40, the deadweight loss is the triangle between supply and demand bounded by Q of 1250 and the new sales rate at P of 40.

Rearrange supply in terms of P.

$P = 5 + 0.036Q$ or $Q = -138.89 + 27.78P$

At $P = 40$, $Q = -138.89 + 27.78(40)$

$Q' = 972.31$ units per year.

The base of the triangle (rotated 90 degrees) is the vertical distance between the heights of supply and demand when $Q = 972.31$

Height of demand = $P = 100 - 0.04(972.31) =$ 61.11

Height of supply = $P = 5 + 0.036(972.31) =$ 40.00

Triangle base is the difference = 21.11

Height of triangle = $Q - Q' = 1250 - 972.31 = 277.69$

Deadweight loss = $1/2\ b \cdot h = (1/2)(21.11)(277.69) = \$2{,}931.$

Diff: 2

Section: 9.1

145) The demand and supply functions for basic cable TV in the local market are given as: $Q_D = 200{,}000 - 4{,}000P$ and $Q_S = 20{,}000 + 2{,}000P$. Calculate the consumer and producer surplus in this market. If the government implements a price ceiling of \$15 on the price of basic cable service, calculate the new levels of consumer and producer surplus. Are all consumers better off? Are producers better off?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price. $Q_D = 200{,}000 - 4{,}000P = Q_S = 20{,}000 + 2{,}000P \Rightarrow P = 30$. At a price of \$30, the quantity exchanged will be: 80,000. The choke price (lowest price such that no units are transacted) is \$50. The consumer surplus is $CS = \frac{1}{2}(50 - 30)\ 80{,}000 = 800{,}000$. Producer surplus is

$PS = 30(20{,}000) + \frac{1}{2}(80{,}000 - 20{,}000)30 = 1{,}500{,}000$. If a price ceiling of \$15 is implemented, producers will only bring 50,000 units to the market.

Consumer surplus is $CS' = 0.5(50{,}000)(50 - 37.5) + (50{,}000)(37.5 - 15)$

$= 312{,}500 + 1{,}125{,}000 = 1{,}437{,}500$

Producer surplus becomes $PS' = 20{,}000(15) + \frac{1}{2}(50{,}000 - 20{,}000)15 = 525{,}000$. In this example, consumer surplus has risen by 637,500. However, not all consumers are better off as the price ceiling brings about a shortage. That is, some consumers are willing to pay \$15 for cable TV yet are unable to get it. Producer surplus shrinks by 65% due to the price ceiling. Producers are worse off.

Diff: 2
Section: 9.1

146) The demand and supply functions for oil on the world market are given as: $Q_D = 25.64 - 0.06P$ and $Q_S = 21.74 + 0.07P$. Calculate consumer surplus. If the Clinton Administration puts a price ceiling of \$20 per unit, calculate the resulting consumer surplus. Are consumers better off?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price. $Q_D = 25.64 - 0.06P = Q_S = 21.74 + 0.07P \Rightarrow P = 30$. At a price of \$30, the quantity exchanged will be: 23.84. The choke price (lowest price such that no units are transacted) is $\$427\frac{1}{3}$. The consumer surplus is $CS = \frac{1}{2}\left(427\frac{1}{3} - 30\right)23.84 = 4{,}736.21$. If a price ceiling of \$20 is implemented, producers will only bring 23.14 units to the market. Consumer surplus is $CS' = 0.5(427.33 - 41.67)(23.14) + (41.67 - 20)(23.14) = 4{,}963.53$. Producer surplus becomes

$PS' = 20(21.74)\ \frac{1}{2}(23.14 - 21.74)20 = 448.80$. In this example, consumer surplus has increased by 5%. In aggregate, consumers are better off. Also, some consumers are worse off as the price ceiling brings about a shortage. That is, there are consumers willing to pay \$20 for a unit and do not get it.

Diff: 2
Section: 9.1

147) The demand and supply functions for pizza in the local market are: $Q_D = 20{,}000 - 833P$ and $Q_S = 5{,}000 + 417P$. Calculate consumer and producer surplus in this market. If the minimum wage is increased by \$2 per hour, the new market supply curve becomes: $Q'_S = 4{,}000 + 417P$. Calculate the loss in consumer and producer surplus in the pizza market due to this change.

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price. $Q_D = 20{,}000 - 833P = Q_S = 5{,}000 + 417P \Rightarrow P = 12$. At a price of \$12, the quantity exchanged will be: 10,004. The choke price (lowest price such that no units are transacted) is \$24. The consumer surplus is $CS = \frac{1}{2}(24 - 12)10{,}004 = 60{,}024$. Producer surplus is

$PS = 12(5{,}000) + \frac{1}{2}(10{,}004 - 5{,}000)12 = 90{,}024$. If the new minimum wage shifts market supply, the new equilibrium price is
$Q_D = 20{,}000 - 833P = Q'_S = 4{,}000 + 417P \Rightarrow P = 12.80$. At a price of \$12.80, the quantity exchanged will be: 9,337.6. The choke price (lowest price such that no units are transacted) is \$24. The consumer surplus is $CS' = \frac{1}{2}(24 - 12.80)9{,}337.6 = 52{,}290.56$.

Producer surplus is $PS = 12.80(4{,}000) + \frac{1}{2}(9{,}337.6 - 4{,}000)12.80 = 85{,}360.64$. The change in societal welfare in the pizza market due to the new minimum wage is:
$\Delta W = (CS' + PS') - (CS + PS) = 137{,}651.2 - 150{,}048 = -12{,}396.80$. The loss in welfare in the local pizza market is 12,396.80 or 8.3%.

Diff: 2
Section: 9.3

148) The market demand and supply functions for pork are:
$Q_D = 2{,}000 - 500P$ and $Q_S = 800 + 100P$. To help pork producers, the U.S. Congress is considering legislation that would put a price floor at \$2.25 per unit. If this price floor is implemented, how many units of pork will the government be forced to buy to keep the price at \$2.25? How much will the government spend in total? How much does producer surplus increase?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price. $Q_D = 2{,}000 - 500P = Q_S = 800 + 100P \Rightarrow P = 2$. At a price of \$2, the quantity exchanged will be: 1,000. The choke price (lowest price such that no units are transacted) is \$4. The consumer surplus is $CS = \frac{1}{2}(4 - 2)1{,}000 = 1{,}000$. Producer surplus is

$PS = 2(800) + \frac{1}{2}(1{,}000 - 800)2 = 1{,}800$. If a price floor of \$2.25 per unit is implemented,

consumers will purchase 875 units. However, producers will bring 1,025 units to the market. The government will be forced to buy up the surplus 150 units at \$2.25 per unit. Consumer surplus is: $CS' = \frac{1}{2}(4 - 2.25)875 = 765.625$. Producer surplus is

$PS' = 2.25(800) + \frac{1}{2}(1{,}025 - 800)2.25 = 2{,}053.125$. Government spending is \$337.50.

Producer surplus increases by \$253.125 or 14.1%. Consumer surplus falls by over 23%.

Diff: 2
Section: 9.3

149) The market demand and supply functions for milk are: $Q_D = 58 - 30.4P$ and $Q_S = 16 + 3.2P$. If a price floor of \$1.75 is implemented, calculate the change in producer surplus. How many surplus units of milk are being produced? If the government purchases all the excess units at \$1.75, calculate the milk expenditures by government? Does the increase in producer surplus due to the price floor exceed government spending on excess milk?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price. $Q_D = 58 - 30.4P = Q_S = 16 + 3.2P \Rightarrow P = 1.25$. At a price of \$1.25, the quantity exchanged will be: 20. The choke price (lowest price such that no units are transacted) is \$1.91. The consumer surplus is

$CS = \frac{1}{2}(1.91 - 1.25)20 = 6.60$. Producer surplus is $PS = 1.25(16) + \frac{1}{2}(20 - 16)1.25 = 22.50$.

If a price floor of \$1.75 is implemented, producers will bring 21.6 units to the market. At this price, consumers will purchase 4.8 units. This leaves a surplus of 16.8 units being produced. Government would need to spend \$29.4 to purchase the excess milk.

Producer surplus with the price floor is: $PS' = 1.75(16) + \frac{1}{2}(21.6 - 16)1.75 = 32.90$.

Producer surplus has increased by \$10.4. The increase in producer surplus does not exceed government spending on milk. This increase in producer surplus is only 35% of the level of government spending on surplus milk.

Diff: 2
Section: 9.3

150) The market for semiskilled labor can be represented by the following supply and demand curves:

$L_D = 32000 - 4000W$ $L_S = 8000 + 6000W$,

where L = millions of person hours per year, and

W = the wage in dollars per hour.

a. Calculate the equilibrium price and quantity that would exist under a free market. What impact does a minimum wage of $3.35 per hour have on the market?

b. The government is contemplating an increase in the minimum wage to $5.00 per hour. Calculate the impact of the new minimum wage on the quantity of labor supplied and demanded.

c. Calculate producer surplus (laborers' surplus) before and after the proposed change. Comment on the net effect of the proposed change upon workers as a whole and on individual workers. How does this price floor differ from an agricultural support price?

d. Is the policy efficient from an economist's viewpoint?

Answer: ***a.***

equate L_D to L_S

$32000 - 4000W = -8000 + 6000W$

$40000 = 10{,}000W$

$W = \$4.00$ per hour

$L_D = 32{,}000 - 4000(4)$

$L_D = 16{,}000$ million person hours

A minimum wage of $3.35 would not be binding, and therefore the market would attain its free market equilibrium.

b.

At the $5.00 proposed minimum:

$L_D = 32{,}000 - 4000(5)$

$L_D = 12{,}000$

$L_S = -8000 + 6000(5)$

$L_S = 22{,}000$

The new minimum wage would create unemployment of 10,000 person hours per year.

c.

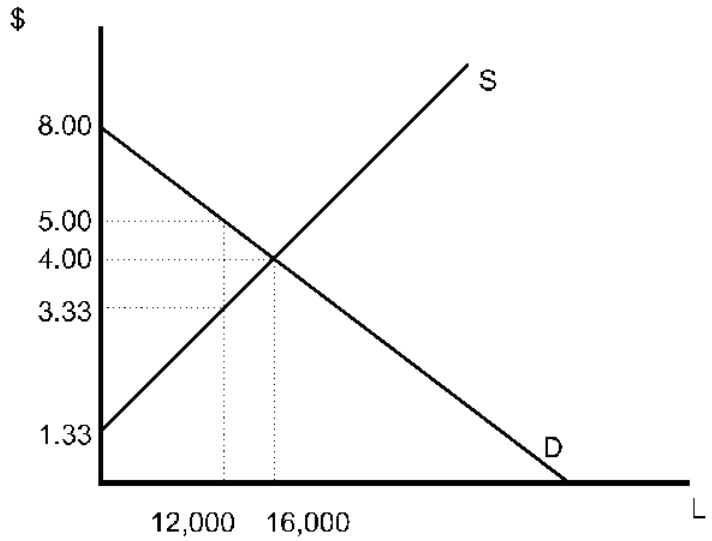
Rewrite L_S and L_D with W on left-hand side:

$L_D = 32{,}000 - 4000W$

$W = 8 - 0.00025L_D$

$L_S = -8000 + 6000W$

$W = 1.33 + 0.000167L_S$



Producer surplus at $4.00 wage:

P. S. = 0.5(4 – 1.33) × 16,000 = 21,360

Determine reservation wage at 12,000

W = 1.33 + 0.000167(12000)

W = 3.33

Producer surplus at $5.00 wage:

P. S. = 0.5 (3.33 – 1.33)*12,000 + (5.00 – 3.33)*12,000 = 32,040

Workers as a whole have been made better off as indicated by the increase in producer surplus. Individual workers who are displaced from labor force are worse off, however. This policy differs from agricultural supports in that government does not buy up the surplus. When government buys the surplus, every producer is better off from the policy.

d.

No, there is a loss in consumer surplus (employer surplus) that has not been calculated. When the loss in consumer surplus is accounted for, it is apparent that there is a deadweight loss from the minimum wage.

Diff: 2
Section: 9.3

151) Consider a competitive market with supply and demand curves expressed as:

Supply $P = 5 + 0.036Q$ Demand $P = 50\ 0.04Q$,

where P represents unit price in dollars and Q represents sales rate in units per day.

a. Determine the equilibrium price and sales rate.

b. If this were the labor market for low skilled workers, what would be the loss in consumer surplus (purchaser surplus) when the minimum wage is set at $40 per day (an eight hour day)?

c. What is the loss or gain in producer surplus (seller surplus) in part b. above?

Answer: ***a.***

Equilibrium price (wage rate) and sales rate (employment rate) are computed as follows:

$5 + 0.036Q = 50 - 0.04Q$

$0.076Q = 45$

$Q = 592.11$ units per day

Wage rate = $P = 50 - .04(592.11) = \$26.32$ per day

b.

Consumer surplus lost would be the area bounded by the minimum wage $40, the market equilibrium wage $26.32, the employment rates, before and after wages, and zero employment. We have a trapezoid made up of a rectangle and a triangle. The rectangle is bounded by the two wages, zero sales, and sales rate at the minimum wage.

Height of rectangle = $W_M - W_E = 40 - 26.32 = 13.68$

Base of rectangle $= Q_M = ?$

$P_M = 50 - 0.04Q_M$

$40 = 50 - 0.04Q_M$

$Q_M = 250$

Area of rectangle = $b \cdot h = (250)(13.68) = 3{,}420.$

Area of triangle with base measured on the vertical.

Base length = $P_M - P_E = 13.68$

Height = $Q_E - Q_M = 592.11 - 250 = 342.11$

Area = $(1/2)b \cdot h = (0.5)(13.68)(342.11) = 2{,}340$

Thus, consumer surplus lost = $3420 + 2340 = \$5760$ per day.

c.

The producer surplus also has two parts. Producers gain the surplus in the rectangle lost by consumers in part b.

Area = 3,420. But, the loss in employment (sales) represents a loss in surplus. This loss is a triangle bounded by supply, equilibrium wage rate, and the two levels of employment (sales rates). The only thing left to compute is the height of the supply curve at

$Q_M = 250.$

Supply $P = 5 + 0.036(250) = 14.$

The area of the triangle of loss is $(1/2)(b \cdot h)$.

Base = $b = 342.11$ (measured horizontally).

Height = $h = 26.32 - 14 = 12.32$.

Area of triangle = $(0.5)(342.11)(12.32) = 2{,}107.40$.

Net change in producer surplus = $\$3420 - 2107.40 = \$1{,}312.60$

Diff: 2

Section: 9.3

152) The supply and demand curves for corn are as follows:

$Q_D = 3{,}750 - 725P$

$Q_S = 920 + 690P$,

where Q = millions of bushels and P = price per bushel.

a. Calculate the equilibrium price and quantity that would prevail in the free market.

b. The government has imposed a $2.50 per bushel support price. How much corn will the government be forced to purchase?

c. Calculate the loss in consumer surplus that would occur under the support program.

Answer: ***a.***

set $Q_D = Q_S$

$3{,}750 - 725P = 920 + 690P$

$2{,}830 = 1{,}415P$

$P = 2.00$

$Q_D = 3{,}750 - 725(2) = 2{,}300$

b.

To solve for government quantity, Q_G, we realize that:

$Q_G = Q_S - Q_D$

$920 + 690P = 3750 - 725P + Q_G$

$Q_G = 1415P - 2830$

Quantity supplied at the support price of $2.50 is:

$Q_S = 920 + 650(2.50)$

$Q_S = 2645$

Quantity demanded at the support price of $2.50 is:

$Q_D = 3750 - 725(2.50)$

$Q_D = 1937.50$

Government quantity purchased is then 707.5 bushels.

c.

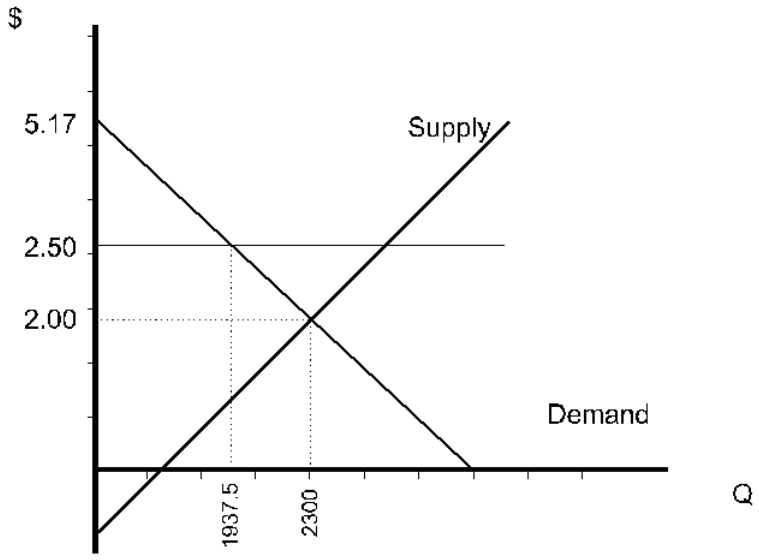
Solve supply and demand for P in terms of Q:

$Q_D = 3750 - 725P$

$P = 5.17 - 0.0014Q$

$Q_S = 920 + 690P$

$P = -1.33 + 0.00145Q$



Q_D at P = 2.50
Q_D = 3750 – 725(2.50)
Q_D = 1937.50

C.S. under free market: = 0.5(5.17 – 2.00) × 2300
C.S. under free market = 3645.5

C.S. under support price: = 0.5(5.17 – 2.50) × 1937.50
C.S. under price support = 2586.56

Price support results in a loss of $1058.94 in consumer surplus.

Diff: 2
Section: 9.4

153) The market for all–leather men's shoes is served by both domestic (U.S.) and foreign (F) producers. The domestic producers have been complaining that foreign producers are dumping shoes onto the U.S. market. As a result, Congress is very close to enacting a policy that would completely prohibit sales by foreign manufacturers of leather shoes in the U.S. market. The demand curve and relevant supply curves for the leather shoe market are as follows:

$Q_D = 50{,}000 - 500P$

$Q_{US} = 6000 + 150P$

$Q_F = 2000 + 50P$,

where Q = thousands of pairs of shoes per year, and P = price per pair.

a. Currently there are no restrictions covering all–leather men's shoes. What are the current equilibrium values?

b. Calculate the price and quantity that would prevail if the proposed policy is enacted.

c. Sketch a diagram that analyzes the economic welfare implications of the proposed policy.

Answer: a.

Without restrictions, the supply curve is the sum of U.S. and foreign supply curves:

$Q_S = Q_{US} + Q_F$

$Q_S = 8000 + 200P$

Equate Q_S and Q_D

$50{,}000 - 500P = 8000 + 200P$

$42000 = 700P$

$P = 60$

$Q_D = 50{,}000 - 500(60)$

$Q = 20{,}000$

b.

Under the proposed policy, Q_{US} is relevant supply curve.

Equate Q_D and Q_{US}

$50{,}000 - 500P = 6000 + 150P$

$44{,}000 = 650P$

$P = 67.69$

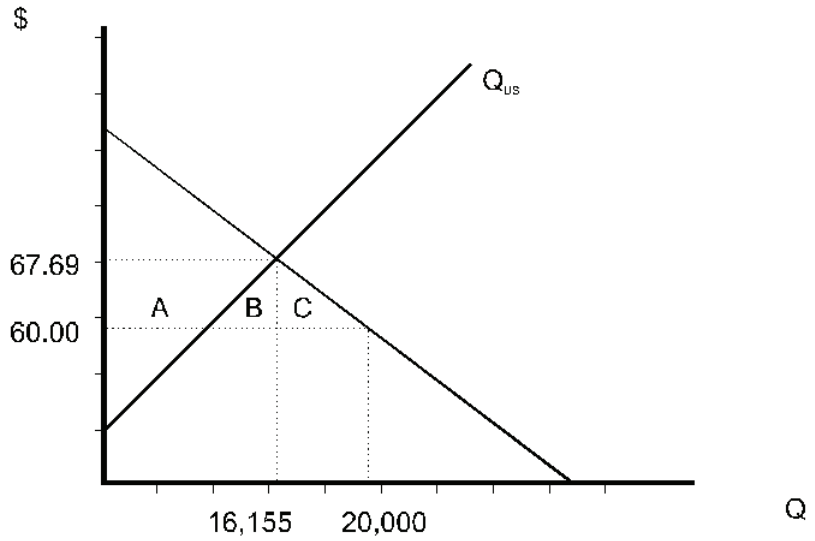
Price rises to 67.69.

$Q_D = 50{,}000 - 500(67.69)$

$Q_D = 16.155$; Quantity falls to 16,155.

c.

Sketch diagram using demand and U.S. supply curve.



Loss in consumer surplus is A + B + C
Gain in producer surplus is A.
It is clear that there is a deadweight loss, even if we assign no value to the producer surplus of foreign manufacturers.

Diff: 2
Section: 9.5

154) The market demand and supply functions for imported cars are: $Q_D = 800{,}000 - 5P$ and $Q_S = 14\frac{1}{6}P + 225{,}000$. The legislature is considering a tariff (a tax on imported goods) equal to \$2,000 per unit to aid domestic car manufacturers. If the tariff is implemented, calculate the loss in producer surplus. How many units of cars are imported? Suppose that instead of a tariff, importers agree to voluntarily restrict their imports to this level. If they do and no tariff is implemented, calculate producer surplus in this scenario. Do you expect importers will be more in favor of a tariff or a voluntary quota?

Answer: First we must determine the market equilibrium quantity and price with the tariff. To do this, we set quantity demanded equal to quantity supplied and solve for the price consumers pay.

$Q_D = 800{,}000 - 5P = Q_S = 14\frac{1}{6}(P - 2{,}000) + 225{,}000 \Rightarrow P = 31{,}478.26$. At a price of \$31,478.26, the quantity imported will be: 642,608.7. Producer surplus is $PS = 29{,}478.26(225{,}000) + \frac{1}{2}(642{,}608.7 - 225{,}000)29{,}478.26 = 12{,}787{,}797{,}732$. If no tariff is implemented, but importers restrict quantity to 642,608.7 units, consumers will pay \$31,478.26 per unit. Now importers receive the full amount of the price consumers pay as there is no tariff. This means that with a voluntary quota, producer surplus must be higher than with a tariff. This is shown as follows. New producer surplus with the voluntary quota is:

$PS = 31{,}478.26(225{,}000) + \frac{1}{2}(642{,}608.7 - 225{,}000)31{,}478.26 = 13{,}655{,}406{,}427.$

Diff: 2
Section: 9.5

155) A country which does not tax cigarettes is considering the introduction of a $0.40 per pack tax. The economic advisors to the country estimate the supply and demand curves for cigarettes as:

$Q_D = 140{,}000\ \ 25{,}000P \qquad Q_S = 20{,}000 + 75{,}000P,$

where Q = daily sales in packs of cigarettes, and P = price per pack. The country has hired you to provide the following information regarding the cigarette market and the proposed tax.

a. What are the equilibrium values in the current environment with no tax?
b. What price and quantity would prevail after the imposition of the tax? What portion of the tax would be borne by buyers and sellers respectively?
c. Calculate the deadweight loss from the tax. Could the tax be justified despite the deadweight loss? What tax revenue will be generated?

Answer: ***a.***

Equate Q_D and Q_S to determine equilibrium price and quantity.

$140{,}000 - 25000P = 20{,}000 + 75{,}000P$
$120{,}000 = 100{,}000P$
$P = 1.20$

Substitute to find Q

$Q_S = 20{,}000 + 75000(1.2)$
$Q_S = 110{,}000$

b.

Four conditions must hold

$Q_D = 140{,}000 - 25{,}000\ P_B$
$Q_S = 20{,}000 + 75{,}000\ P_S$
$Q_D = Q_S$
$P_B - P_S = 0.40$
or $P_B = P_S + 0.40$

Equilibrium requires:

$140{,}000 - 25{,}000P_B = 20{,}000 + 75{,}000\ P_S$

Substituting for P_B

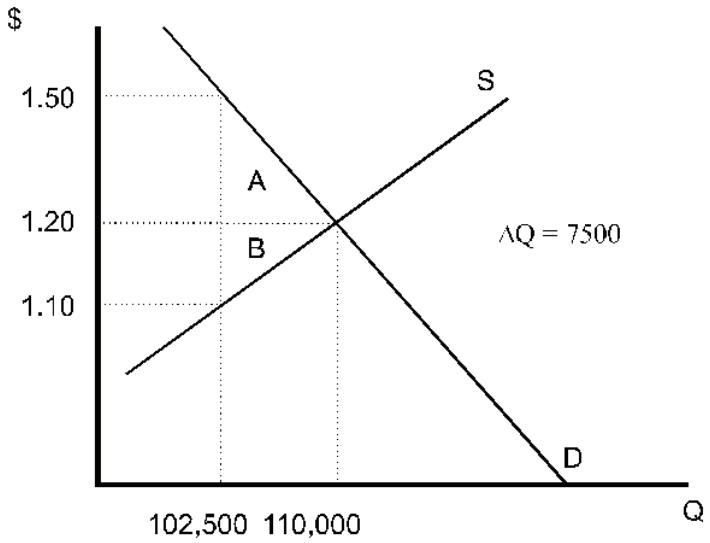
$140{,}000 - 25{,}000(P_S + 0.40) = 20{,}000 + 75{,}000P_S$
$140{,}000 - 25{,}000P_S - 10{,}000 = 20{,}000 + 75{,}000P_S$
$110{,}000 = 100{,}000P_S$
$P_S = 1.10$
$P_B = P_S + 0.40$
$P_B = \$1.50$

Tax is paid $0.30 by buyer and $0.10 by seller. (Buyers' price goes from $1.20 to $1.50, sellers' price from $1.20 to $1.10).

c.

Find Q by substituting P_B into Q_D or P_S into Q_S

$Q_D = 140{,}000 - 25{,}000(1.5)$
$Q_D = 102{,}500$
$Q_S = 20{,}000 + 75{,}000(1.10)$
$Q_S = 102{,}500$



Deadweight loss consists of two portions; 'A' a loss in C.S. and 'B' a loss in producer surplus.

Calculating A:

Area A = [(1.50 + 1.20) ÷ 2] × 7500 – (1.20 × 7500)

Area A = 10,125 – 9000 = 1,125

Calculating Area B:

Area B = (1.20 × 7500) – [(1.10 + 1.20) ÷ 2] × 7500

Area B = 9000 – 8625 = 375

Deadweight Loss = A + B = $1500.

Arguments favoring the policy are the usual externality arguments regarding shared health costs, lost worker productivity, and the dangers of second–hand smoke. The tax may approximate costs that have not been reflected in the free market supply curve.

Tax revenue = tax * quantity

Tax revenue = (0.40)(102,500)

Tax revenue = 41,000 per day or $14,965,000 per year.

Diff: 2
Section: 9.6

156) The total and marginal cost functions for a typical soft coal producer are:

$TC = 75{,}000 + 0.1Q^2$ and $MC = 0.2Q$

where Q is measured in railroad cars per year. The industry consists of 55 identical producers. The market demand curve is:

$Q_D = 140{,}000 - 425P$,

where P is the price per carload. The market can be regarded as competitive.

a. Calculate the short run equilibrium price and quantity in the market. Calculate the quantity that each firm would produce. Calculate producer surplus, consumer surplus, and total surplus at the equilibrium values. Calculate the firm's profit (or loss).
b. The Federal government is considering the imposition of a $15 per carload tax on soft coal. Calculate the short–run equilibrium price and quantity that would exist under the tax. What portion of the tax would be paid by producers and what portion by consumers? Calculate the producer and consumer surplus under the tax and analyze the efficiency consequences of the tax. Calculate the firm's profit (or loss) under the tax. Could the tax be justified despite its efficiency implications?

Answer: ***a.***

To find market supply curve begin by finding firm's supply curve.
Firm's supply curve is MC curve (in this case all of MC lies above AVC):
Solve for Q in terms of MC = P:

$MC = 0.2Q$
$Q = 5P$

Market short–run supply is the horizontal sum of firm supply. There are 55 firms in the market, so market supply is 55 times the individual firm's supply.

$Q_S = 275P$

Equate Q_D and Q_S to determine P and Q.

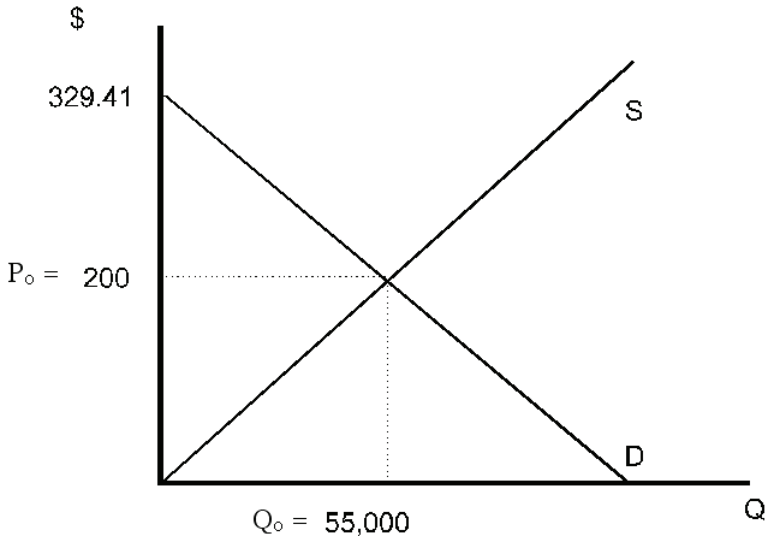
$275P = 140{,}000 - 425P$
$700P = 140{,}000$
$P = \$200$
$Q = 275(200)$
$Q = 55{,}000$

Individual firm equates P to MC

$200 = 0.2Q$
$Q = 1{,}000$
$\pi = TR - TC$
$TR = (200)(1000)$
$TR = 200{,}000$
$TC = 75{,}000 + 0.1(1000)^2$
$TC = 175{,}000$
$\pi = 25{,}000$

Producer and consumer surplus:
Solve for P in terms of Q.

$Q_S = 275P$
$P = 0.0036Q$
$Q_D = 140{,}000 - 425P$
$P = 329.41 - 0.0024Q$



Producer surplus = 0.5(55,000)(200) = 5,500,000
Consumer surplus = 0.5(55,000)(329.41 – 200) = 3,558,775
Total of producer and consumer surplus is
3,558,775 + 5,550,000 = 9,058,775

b.

P_b = buyer's price
P_S = seller's price (net of tax)
$P_b - P_S = 15$ = tax
$Q_D = 140{,}000 - 425\ P_b$ is market demand
$Q_S = 275\ P_S$ is market supply

Set supply equal to demand:

$140{,}000 - 425\ P_b = 275\ P_S$
$P_b = P_S + 15$
$140{,}000 - 425\ (P_S + 15) = 275\ P_S$
$140{,}000 - 425\ P_S - 6{,}375 = 275\ P_S$
$P_S = 190.89$
$P_b = P_S + 15 = 205.89$

Consumers pay:

$P_b - P_o = 205.89 - 200 = 5.89$

Producers pay:

$P_o - P_S = 200 - 190.89 = 9.11$

Plug P_S into the supply equation to get quantity:

$Q = Q_S = 275\ P_S = 275(190.89) = 52{,}495$

(If you plug into the demand equation instead your answer will differ slightly due to rounding.) Individual firm equates P to MC

$205.89 = 0.2Q + 15$
$Q = 954.5$
$\pi = TR - TC$
$TR = 205.89(954.50)$
$TR = 196{,}522$
$TC = 75{,}000 + 0.1Q^2 + 15Q$
$TC = 180{,}424.53$

π = 16,097.48

Profit fell from 25,000 to 16,097.48

Producer and Consumer Surplus:

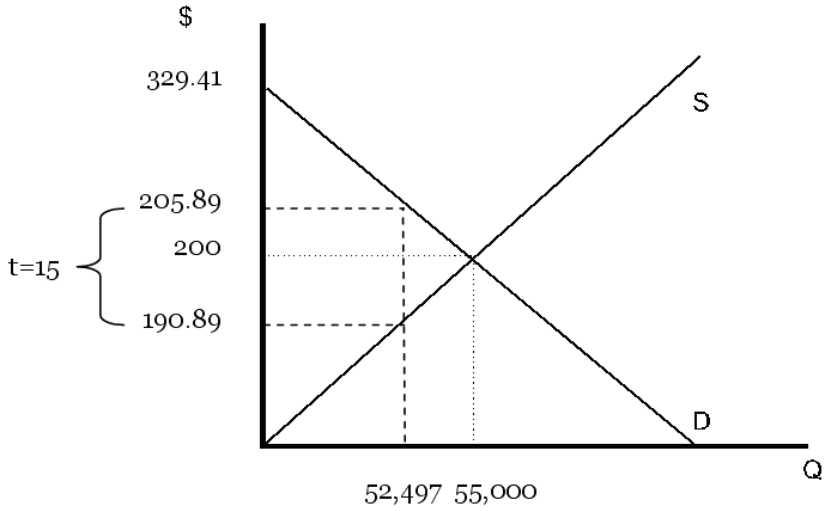
Demand curve remains: P = 329.41 – 0.0024Q

Solve for P in terms of Q_S.

$Q_S = -4125 + 275P$

$275P = Q_S + 4{,}125$

$P = 15 + 0.0036\,Q$



Producer surplus = 0.5(52,497)(205.89) = 5,404,303.67

Consumer surplus = 0.5(52,497)(329.41 – 205.89) = 3,242,214.72

Total of Producer and Consumer Surplus:

= 5,404,303.67 + 3,242,214.72 = 8,646,518.39

Total surplus fell from 9,058,775 to 8,646,518.39

There is a welfare loss as indicated by the loss in total surplus. The tax could be justified by known externalities of soft coal.

Diff: 2
Section: 9.6

157) The world price for oil is \$31 per unit. The supply of domestic oil is: $Q_S = 0.15P - 2.7$.

Domestic producers can sell as many units as they like at world prices. Calculate current domestic producer surplus. Now, suppose in an effort to boost domestic oil production the government pays producers \$2 per unit produced. Calculate the new level of producer surplus. Also, calculate the amount the government spends in payments to domestic producers. Does the change in producer surplus exceed the amount of payments made by the government? If government directly paid domestic oil producers the amount they will spend in the subsidy scenario, would domestic oil producers be better off?

Answer: At the world price of \$31 per unit, domestic oil producers will bring 1.95 units to the market. The highest price where domestic producers will not bring any oil to market is \$18. Producer surplus is: $PS = \frac{1}{2}(31 - 18)1.95 = 12.675$. If the government pays domestic oil producers an additional \$2 per unit to produce oil, producers will raise quantity supplied to $Q_S' = 0.15(31 + 2) - 2.7 = 2.25$. Producer surplus is: $PS = \frac{1}{2}(31 + 2 - 18)2.25 = 16.875$. The government is paying \$2 per unit for each of the 2.25 units. Total government payments are \$4.50. The increase in producer surplus is \$4.20. The increase in domestic producer surplus does not exceed the payments made by government. If government directly gave oil producers \$4.50 without the subsidy, oil producers would be better off.

Diff: 2
Section: 9.6

158) The market demand and supply functions for pizza are: $Q_D = 25{,}000 - 1{,}500P$ and $Q_S = 2{,}500P - 15{,}000$. Calculate the consumer and producer surplus. Suppose the local community charges a \$1 per pizza tax. Calculate the new levels of consumer and producer surplus. Does the gain in tax revenue offset the losses in consumer and producer surplus associated with the tax?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price.
$Q_D = 25{,}000 - 1{,}500P = Q_S = 2{,}500P - 15{,}000 \Rightarrow P = 10$.
At a price of \$10, the quantity exchanged will be: 10,000. The choke price (lowest price such that no units are transacted) is $\$16\frac{2}{3}$. The highest price such that no pizzas will be produced is \$6. Consumer surplus is $CS = \frac{1}{2}\left(16\frac{2}{3} - 10\right)10{,}000 = 33{,}333\frac{1}{3}$. Producer surplus is
$PS = \frac{1}{2}(10 - 6)10{,}000 = 20{,}000$. Welfare in the market is $\$53{,}333\frac{1}{3}$. If a tax of \$1 per unit is implemented, we need to determine the new equilibrium quantity and price consumers pay.
$Q_D = 25{,}000 - 1{,}500P = Q_S = 2{,}500(P - 1) - 15{,}000 \Rightarrow P = 10.625$. At this price, consumers purchase 9,062.5 units. Consumer surplus is $CS' = \frac{1}{2}\left(16\frac{2}{3} - 10.625\right)\ 9{,}062.5 = 27{,}376.30$. Producer surplus is $PS' = \frac{1}{2}(9.625 - 6)\ 9{,}062.5 = 16{,}425.78$. Government tax revenues are \$9,062.50. The new level of welfare is \$52,864.58. The increase in government tax receipts does not offset the loss in consumer and producer surplus and welfare has gone down in the market because of the tax.

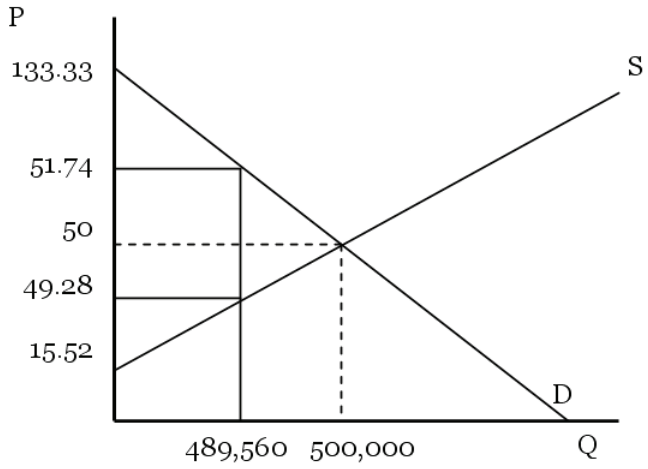
Diff: 2
Section: 9.6

159) The local community is considering two options to raise money to finance a new civic center. The first option is to institute a per unit tax on restaurant meals of \$2.46. The market demand and supply functions for restaurant meals are:
$Q_D = 800{,}000 - 6{,}000P$ and $Q_S = 14{,}500P - 225{,}000$. Calculate consumer and producer surplus with the per unit tax. The second option the community is considering implementing is an income tax. If an income tax is implemented, the new demand for restaurant meals is:
$Q'_D = 794{,}875 - 6{,}000P$. Calculate the level of consumer and producer surplus in the restaurant market with the income tax. Which of the two options will reduce the sum of consumer and producer surplus the least?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price consumers pay with the tax.

$Q_D = 800{,}000 - 6{,}000\ P_b = Q_s = 14{,}500(P_b - 2.46) - 225{,}000$
$P_b = 51.74$

The quantity exchanged will be: 489,560. The choke price (lowest price such that no units are transacted) is 133.33.
Consumer surplus is $CS = 0.5(133.33 - 51.74)(489{,}560) = 19{,}971{,}600$.
Producer surplus is $PS = 0.5(49.28 - 15.52)(489{,}560) = 8{,}263{,}773$.
Government tax receipts are \$1,204,317.60.
Consumer and producer surplus with the tax is 28,235,373.



Per Unit Tax Policy

With an income tax, we need to determine the new equilibrium price and quantity.

$Q_D = 794{,}875 - 6{,}000P = Q_s = 14{,}500P \Rightarrow P = 49.75$. At a price of \$49.75, the quantity exchanged will be: 496,375. The choke price (lowest price such that no units are transacted) is $\$133\frac{1}{3}$. The highest price such that no meals will be produced is \$15.52.

Consumer surplus is
$CS' = \frac{1}{2}\left(133\frac{1}{3} - 49.75\right)496{,}375 = 20{,}744{,}337$. Producer surplus is
$PS' = \frac{1}{2}(49.75 - 15.52)496{,}375 = 8{,}495{,}458.10$. The sum of consumer and producer

surplus with the income tax is $29,239,795.10. Since consumer and producer surplus is higher for the income tax, the income tax does the least harm to societal welfare than the per unit tax.

Diff: 2
Section: 9.6

160) The market demand and supply functions for imported beer are: $Q_D = 48{,}000 - 406.25P$ and $Q_S = 1{,}781.25P - 22{,}000$. To encourage the consumption of domestic beer, Congress has imposed a quota of 25,000 units of imported beer. Calculate the change in producer surplus from this legislation.

Answer: First we must determine the market equilibrium quantity and price before the quota. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price.
$Q_D = 48{,}000 - 406.25P = Q_S = 1{,}781.25P - 22{,}000 \Rightarrow P = 32$. At a price of $32, the quantity exchanged will be: 35,000. The choke price (lowest price such that no units are transacted) is $118.15. The highest price such that no beer will be imported is $12.35. Consumer surplus is
$CS = \frac{1}{2}(118.15 - 32)\ 35{,}000 = 1{,}507{,}625$. Producer surplus is
$PS = \frac{1}{2}(32 - 12.35)\ 35{,}000 = 343{,}875$. If a quota of 25,000 units is implemented, consumers will bid the market price up to $56.52 for each of the units. The new producer surplus is: $PS = \frac{1}{2}(56.52 - 12.35)\ 25{,}000 = 552{,}125$. In this example, the producer surplus has increased by $208,250 or 60.6%.

Diff: 2
Section: 9.6

161) The market demand and supply functions for toothpaste are: $Q_D = 12 - 0.04P$ and $Q_S = 3.8P + 4$. Calculate the equilibrium quantity and price and point elasticity of demand in equilibrium. Next, calculate consumer surplus. Suppose the toothpaste market is taxed \$0.25 per unit. Calculate the revenues generated by the tax. Calculate the loss in consumer surplus. What percentage of the burden of the tax is paid for by consumers?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price.
$Q_D = 12 - 0.04\ P = Q_S = 3.8\ P + 4$
Then P = 2.08, and at this price we have Q = 11.92
The point elasticity of demand is $E_d = \left(\frac{\Delta Q_D}{\Delta P}\right)\frac{P}{Q} = -0.04\left(\frac{2.08}{11.92}\right) = -0.007$. The choke price (lowest price such that no units are transacted) is \$300.
The consumer surplus is $CS = 0.5(300 - 2.08)(11.92) = 1{,}775.60$.

If the toothpaste market is taxed \$0.25 per unit, the equilibrium price consumers pay is:

$$Q_D = 12 - 0.04\ P_b = Q_s = 3.8(P_b - 0.25) + 4$$

Therefore, $P_b = 2.33$. The quantity exchanged is 11.91. The new level of consumer surplus is:

$$CS' = 0.5(300 - 2.33)(11.91) = 1{,}772.62.$$

The tax generates tax revenues of \$2.98. Consumers bear virtually all of the burden of the tax. Consumer surplus decreases by 2.98.

Diff: 2
Section: 9.6

162) The market demand and supply functions for Easton Redline slow-pitch softball bats are: $Q_D = 12 - 0.04P$ and $Q_S = 0.01P + 2$. Calculate the equilibrium quantity and price and point elasticity of demand in equilibrium. Next, calculate consumer surplus. Suppose the Easton bats are taxed \$25 per unit. Calculate the revenues generated by the tax. Calculate the loss in consumer surplus. What percentage of the burden of the tax is paid for by consumers?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price.
$Q_D = 12 - 0.04\ P = Q_S = 0.01P + 2 \Rightarrow\ P = 200$. At a price of \$200, the quantity exchanged will be 4. The point elasticity of demand is $E_d = \left(\frac{\Delta Q_D}{\Delta P}\right)\frac{P}{Q} = -0.04\left(\frac{200}{4}\right) = -2$. The choke price (lowest price such that no units are transacted) is \$300. The consumer surplus is $CS = \frac{1}{2}(300 - 200)\ 4 = 200$. If the bat market is taxed \$25 per unit, the equilibrium price consumers pay is:
$Q_D = 12 - 0.04\ P = Q_S = 0.01(P - 25) + 2 \Rightarrow P = 205$. The quantity exchanged is 3.8. The new level of consumer surplus is: $CS = \frac{1}{2}(300 - 205)\ 3.8 = 180.5$. The loss in consumer surplus associated with the tax is \$19.50. The tax generates tax revenues of \$95. Consumers pay \$5 more per unit. Thus, consumers bear 20% of the burden of the tax.

Diff: 3
Section: 9.6

163) The market demand and supply functions for alcohol at Major League Baseball games are: $Q_D = 10 - 0.04P$ and $Q_S = 3.8P - 2$. Calculate the equilibrium quantity and price and point elasticity of supply in equilibrium. Next, calculate producer surplus. Suppose that alcohol is taxed at \$0.75 per unit at the games. Calculate the revenues generated by the tax. Calculate the loss in producer surplus. What percentage of the burden of the tax falls on producers?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price.

$$Q_D = 10 - 0.04P = Q_S = 3.8P - 2$$

Therefore P = 3.13, and at this price the quantity exchanged will be 9.87. The point elasticity of supply is $E_S = \left(\frac{\Delta Q_S}{\Delta P}\right)\frac{P}{Q} = 3.8\left(\frac{3.13}{9.87}\right) = 1.21$. The producer surplus is:

$$PS = 0.5(9.87)(3.13 - 0.53) = 12.83$$

If the market is taxed \$0.75 per unit, the equilibrium price consumers pay is:

$$Q_D = 10 - 0.04\,P_b = Q_S = 3.8(P_b - 0.75) - 2$$

Therefore $P_b = 3.87$, $P_s = P_b - 0.75 = 3.12$, and the quantity exchanged is 9.85. The new level of producer surplus is: $PS' = 0.5(3.12 - 0.53)(9.85) = 12.76$.

The change in producer surplus associated with the tax is –0.07. The tax generates tax revenues of \$7.39. Producers bear $P_o - P_s = 3.13 - 3.12 = 0.01$. Consumers bear $P_b - P_o = 3.87 - 3.13 = 0.74$. Producers bear 1.33 % of the tax.

Diff: 3
Section: 9.6

164) The market demand and supply functions for VCR movie rentals are: $Q_D = 10 - 0.04P$ and $Q_S = 3.8P + 4$. Calculate the equilibrium quantity and price and point elasticity of demand in equilibrium. Next, calculate producer surplus. Suppose that VCR movie rentals are taxed at \$0.25 per unit. Calculate the revenues generated by the tax. Calculate the loss in producer surplus. What percentage of the burden of the tax falls on producers?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price.

$$Q_D = 10 - 0.04P = Q_S = 3.8P + 4$$

Then P = 1.56, and at this price we have Q = 9.94.

The point elasticity of supply is $E_S = \left(\frac{\Delta Q_S}{\Delta P}\right)\frac{P}{Q} = 3.8\left(\frac{1.56}{9.94}\right) = 0.60$. The producer surplus is

$$PS = 4(1.56) + 0.5(9.94 - 4)(1.56) = 10.87.$$

If the market is taxed \$0.25 per unit, the equilibrium price consumers pay is:

$$Q_D = 10 - 0.04\,P_b = Q_s = 3.8(P_b - 0.25) + 4$$

Then $P_b = 1.81$. The quantity exchanged is 9.93. The new level of producer surplus is:

$$PS' = 4(1.5599) + 0.5(9.93 - 4)(1.5599) = 10.86.$$

The loss in producer surplus associated with the tax is \$0.01. The tax generates tax revenues of \$2.48. Thus, producers bear less than 1% of the burden of the tax.

Diff: 3
Section: 9.6

165) The market demand and supply functions for cotton are: $Q_D = 10 - 0.04P$ and $Q_S = 38P - 20$. Calculate the consumer and producer surplus. To assist cotton farmers, suppose a subsidy of \$0.10 a unit is implemented. Calculate the new level of consumer and producer surplus. Did the increase in consumer and producer surplus exceed the increased government spending necessary to finance the subsidy?

Answer: First we must determine the market equilibrium quantity and price. To do this, we set quantity demanded equal to quantity supplied and solve for equilibrium price. $Q_D = 10 - 0.04P = Q_S = 38P - 20 \Rightarrow P = 0.79$. At a price of \$0.79 the quantity exchanged will be 9.97 units. The choke price is \$250 and the reservation price is \$0.53. The consumer surplus is

$CS = \frac{1}{2}(250 - 0.79)\,9.97 = 1{,}242.31$. Producer surplus is $PS = \frac{1}{2}(0.79 - 0.53)\,9.97 = 1.30$.

With the subsidy, the equilibrium price that consumers pay is given by: $Q_D = 10 - 0.04P = Q_S = 38(P + 0.10) - 20 \Rightarrow P = 0.69$. The new level of consumer surplus is

$CS' = \frac{1}{2}(250 - 0.69)\,9.97 = 1{,}242.81$. Producer surplus is $PS = \frac{1}{2}(0.79 - 0.53)\,9.97 = 1.30$.

Government spending is \$0.997. The increase in consumer surplus is \$0.50. Producer surplus didn't change. The increase in consumer and producer surplus is less than government spending.

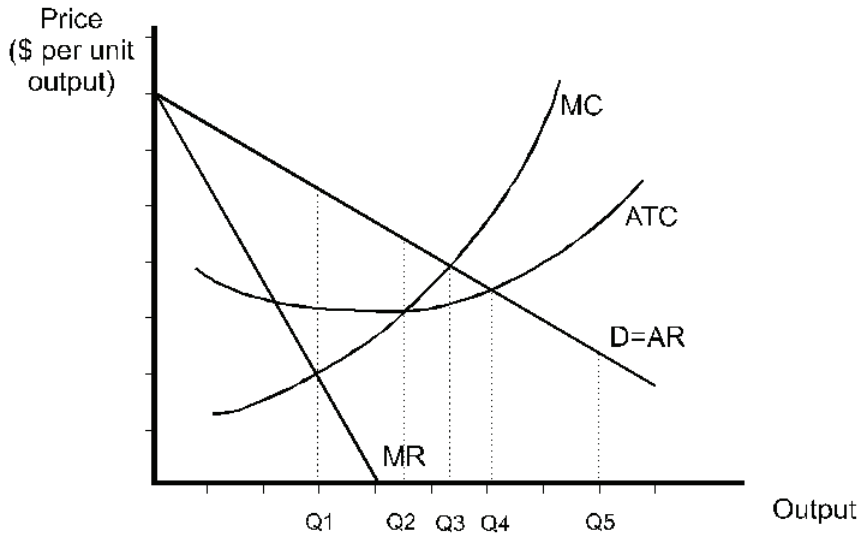
Diff: 2
Section: 9.6

Chapter 10 Market Power: Monopoly and Monopsony

1) When the demand curve is downward sloping, marginal revenue is
A) equal to price.
B) equal to average revenue.
C) less than price.
D) more than price.

Answer: C
Diff: 1
Section: 10.1

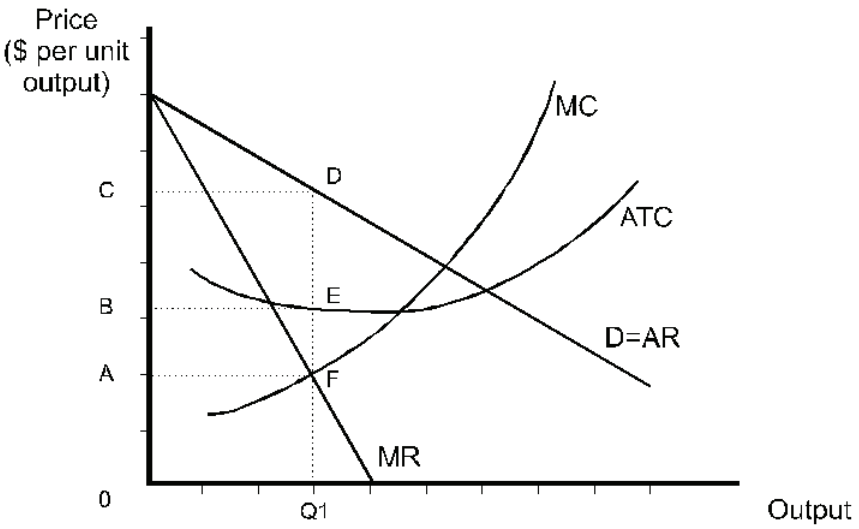
2) For the monopolist shown below, the profit maximizing level of output is:



A) Q1.
B) Q2.
C) Q3.
D) Q4.
E) Q5.

Answer: A
Diff: 1
Section: 10.1

3) How much profit will the monopolist whose cost and demand curves are shown below earn at output Q1?



A) 0CDQ1 B) 0BEQ1 C) 0AFQ1 D) ACDF E) BCDE

Answer: E
Diff: 1
Section: 10.1

4) Which of the following is NOT true regarding monopoly?
A) Monopoly is the sole producer in the market.
B) Monopoly price is determined from the demand curve.
C) Monopolist can charge as high a price as it likes.
D) Monopoly demand curve is downward sloping.

Answer: C
Diff: 1
Section: 10.1

5) Which of the following is true at the output level where P=MC?
A) The monopolist is maximizing profit.
B) The monopolist is not maximizing profit and should increase output.
C) The monopolist is not maximizing profit and should decrease output.
D) The monopolist is earning a positive profit.

Answer: C
Diff: 1
Section: 10.1

6) Compared to the equilibrium price and quantity sold in a competitive market, a monopolist will charge a _____ price and sell a _____ quantity.
   A) higher; larger
   B) lower; larger
   C) higher; smaller
   D) lower; smaller
   E) none of these

Answer: C
Diff: 1
Section: 10.1

7) Assume that a profit maximizing monopolist is producing a quantity such that marginal revenue exceeds marginal cost. We can conclude that the
   A) firm is maximizing profit.
   B) firm's output is smaller than the profit maximizing quantity.
   C) firm's output is larger than the profit maximizing quantity.
   D) firm's output does not maximize profit, but we cannot conclude whether the output is too large or too small.

Answer: B
Diff: 1
Section: 10.1

8) To find the profit maximizing level of output, a firm finds the output level where
   A) price equals marginal cost.
   B) marginal revenue and average total cost.
   C) price equals marginal revenue.
   D) all of the above
   E) none of the above

Answer: E
Diff: 1
Section: 10.1

9) As the manager of a firm you calculate the marginal revenue is $152 and marginal cost is $200. You should
   A) expand output.
   B) do nothing without information about your fixed costs.
   C) reduce output until marginal revenue equals marginal cost.
   D) expand output until marginal revenue equals zero.
   E) reduce output beyond the level where marginal revenue equals zero.

Answer: C
Diff: 1
Section: 10.1

10) Suppose that a firm can produce its output at either of two plants. If profits are maximized, which of the following statements is true?
A) The marginal cost at the first plant must equal marginal revenue.
B) The marginal cost at the second plant must equal marginal revenue.
C) The marginal cost at the two plants must be equal.
D) all of the above
E) none of the above

Answer: D
Diff: 1
Section: 10.1

11) The monopolist has no supply curve because
A) the quantity supplied at any particular price depends on the monopolist's demand curve.
B) the monopolist's marginal cost curve changes considerably over time.
C) the relationship between price and quantity depends on both marginal cost and average cost.
D) there is a single seller in the market.
E) although there is only a single seller at the current price, it is impossible to know how many sellers would be in the market at higher prices.

Answer: A
Diff: 1
Section: 10.1

12) When a per unit tax is imposed on the sale of a product of a monopolist, the resulting price increase will
A) always be less than the tax.
B) always be more than the tax.
C) always be less than if a similar tax were imposed on firms in a competitive market.
D) not always be less than the tax.

Answer: D
Diff: 1
Section: 10.1

13) The monopoly supply curve is the
A) same as the competitive market supply curve.
B) portion of marginal costs curve where marginal costs exceed the minimum value of average variable costs.
C) result of market power and production costs.
D) none of the above

Answer: D
Diff: 1
Section: 10.1

14) For a monopolist, changes in demand will lead to changes in
A) price with no change in output.
B) output with no change in price.
C) both price and quantity.
D) any of the above can be true.

Answer: C
Diff: 1
Section: 10.1

15) Use the following two statements to answer this question:
I. For a monopolist, at every output level, average revenue is equal to price.
II. For a monopolist, at every output level, marginal revenue is equal to price.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.
E) Statements I and II could either be true or false depending upon demand.

Answer: B
Diff: 1
Section: 10.1

16) Which of the following is NOT true for monopoly?
A) The profit maximizing output is the one at which marginal revenue and marginal cost are equal.
B) Average revenue equals price.
C) The profit maximizing output is the one at which the difference between total revenue and total cost is largest.
D) The monopolist's demand curve is the same as the market demand curve.
E) At the profit maximizing output, price equals marginal cost.

Answer: E
Diff: 2
Section: 10.1

17) If a monopolist sets her output such that marginal revenue, marginal cost and average total cost are equal, economic profit must be:
A) negative.
B) positive.
C) zero.
D) indeterminate from the given information.

Answer: B
Diff: 2
Section: 10.1

18) A monopolist has equated marginal revenue to zero. The firm has:
A) maximized profit.
B) maximized revenue.
C) minimized cost.
D) minimized profit.

Answer: B
Diff: 2
Section: 10.1

19) A monopolist has determined that at the current level of output the price elasticity of demand is –0.15. Which of the following statements is true?
A) The firm should cut output.
B) This is typical for a monopolist; output should not be altered.
C) The firm should increase output.
D) None of the above is necessarily correct.

Answer: A
Diff: 2
Section: 10.1

20) A monopolist has set her level of output to maximize profit. The firm's marginal revenue is $20, and the price elasticity of demand is –2.0. The firm's profit maximizing price is approximately:
A) $0
B) $20
C) $40
D) $10
E) This problem cannot be answered without knowing the marginal cost.

Answer: C
Diff: 3
Section: 10.1

Scenario 10.1:
Barbara is a producer in a monopoly industry. Her demand curve, total revenue curve, marginal revenue curve and total cost curve are given as follows:

$Q = 160 - 4P$ $TR = 40Q - 0.25Q^2$ $MR = 40 - 0.5Q$ $TC = 4Q$ $MC = 4$

21) Refer to Scenario 10.1. How much output will Barbara produce?
A) 0
B) 22
C) 56
D) 72
E) none of the above

Answer: D
Diff: 2
Section: 10.1

22) Refer to Scenario 10.1. The price of her product will be _____.
A) 4 B) 22 C) 32 D) 42 E) 72

Answer: B
Diff: 2
Section: 10.1

23) Refer to Scenario 10.1. How much profit will she make?
A) –996
B) 0
C) 1,296
D) 1,568
E) none of the above

Answer: C
Diff: 2
Section: 10.1

Scenario 10.2:
A monopolist faces the following demand curve, marginal revenue curve, total cost curve and marginal cost curve for its product:

$Q = 200 - 2P$
$MR = 100 - Q$
$TC = 5Q$
$MC = 5$

24) Refer to Scenario 10.2. What level of output maximizes total revenue?
A) 0
B) 90
C) 95
D) 100
E) none of the above

Answer: D
Diff: 2
Section: 10.1

25) Refer to Scenario 10.2. What is the profit maximizing level of output?
A) 0
B) 90
C) 95
D) 100
E) none of the above

Answer: C
Diff: 2
Section: 10.1

26) Refer to Scenario 10.2. What is the profit maximizing price?
A) $95.00 B) $5.00 C) $52.50 D) $10.00

Answer: C
Diff: 2
Section: 10.1

27) Refer to Scenario 10.2. How much profit does the monopolist earn?
A) $4512.50 B) $4987.50 C) $475.00 D) $5.00

Answer: A
Diff: 2
Section: 10.1

28) Refer to Scenario 10.2. Suppose that a tax of $5 for each unit produced is imposed by state government. What is the profit maximizing level of output?
A) 0
B) 90
C) 95
D) 100
E) none of the above

Answer: B
Diff: 2
Section: 10.1

29) Refer to Scenario 10.2. Suppose that a tax of $5 for each unit produced is imposed by state government. What is the profit maximizing price?
A) $90.00 B) $10.00 C) $55.00 D) $52.50

Answer: C
Diff: 2
Section: 10.1

30) Refer to Scenario 10.2. Suppose that a tax of $5 for each unit produced is imposed by state government. How much profit does the monopolist earn?
A) $4050 B) $4950 C) $450 D) $5

Answer: A
Diff: 3
Section: 10.1

31) Refer to Scenario 10.2. Suppose that in addition to the tax, a business license is required to stay in business. The license costs $1000. What happens to profit?
A) It increases by $1000. B) It decreases by $1000.
C) It decreases by less than $1000. D) It stays the same.

Answer: B
Diff: 3
Section: 10.1

32) Refer to Scenario 10.2. Suppose that in addition to the tax, a business license is required to stay in business. The license costs $1000. What is the profit maximizing level of output?
A) 0
B) 90
C) 95
D) 100
E) none of the above

Answer: B
Diff: 3
Section: 10.1

Scenario 10.3:
The demand curve and marginal revenue curve for red herrings are given as follows:
$Q = 250 - 5P$
$MR = 50 - 0.4Q$

33) Refer to Scenario 10.3. What level of output maximizes revenue?
A) 0 B) 45 C) 85 D) 125 E) 245

Answer: D
Diff: 2
Section: 10.1

34) Refer to Scenario 10.3. The marginal cost of red herrings is given as: $MC = 0.6Q$. What is the profit–maximizing level of output?
A) 0 B) 25 C) 50 D) 60 E) 125

Answer: C
Diff: 2
Section: 10.1

35) Refer to Scenario 10.3. At the profit–maximizing level of output, demand is
A) completely inelastic.
B) inelastic, but not completely inelastic.
C) unit elastic.
D) elastic, but not infinitely elastic.
E) infinitely elastic.

Answer: D
Diff: 2
Section: 10.1

36) Refer to Scenario 10.3. Compared to a competitive red herring industry, the monopolistic red herring industry
A) produces more output at a higher price.
B) produces less output at a higher price.
C) produces more output at a lower price.
D) produces less output at a lower price.
E) not enough information to relate the monopolistic red herring industry to a competitive industry.

Answer: B
Diff: 2
Section: 10.1

37) Refer to Scenario 10.3. Suppose that a tax of $5 per unit of output is imposed on red herring producers. The price of red herring will
A) not change.
B) increase by less than $5.
C) increase by $5.
D) increase by more than $5.
E) decrease.

Answer: B
Diff: 3
Section: 10.1

Scenario 10.4:
The demand for tickets to the Meat Loaf concert (Q) is given as follows:

$Q = 120{,}000 - 2{,}000P$

The marginal revenue is given as:

$MR = 60 - .001Q$

The stadium at which the concert is planned holds 60,000 people. The marginal cost of each additional concert goer is essentially zero up to 60,000 fans, but becomes infinite beyond that point.

38) Refer to Scenario 10.4. Given the information above, what are the profit maximizing number of tickets sold and the price of tickets?
A) 0, $60
B) 20,000, $50
C) 40,000, $40
D) 60,000, $30
E) 80,000, $20

Answer: D
Diff: 2
Section: 10.1

39) Refer to Scenario 10.4. Suppose that the municipal stadium authority imposes a tax of $10 per ticket on the concert promoters. Given the information above, the profit maximizing ticket price would
A) increase by $10.
B) increase by $5.
C) not change.
D) decrease by $5.
E) decrease by $10.

Answer: B
Diff: 2
Section: 10.1

40) A multiplant monopolist can produce her output in either of two plants. Having sold all of her output she discovers that the marginal cost in plant 1 is $30 while the marginal cost in plant 2 is $20. To maximize profits the firm will
A) produce more output in plant 1 and less in the plant 2.
B) do nothing until it acquires more information on revenues.
C) produce less output in plant 1 and more in plant 2.
D) produce less in both plants until marginal revenue is zero.
E) shut down plant 1 and only produce at plant 2 in the future.

Answer: C
Diff: 2
Section: 10.1

Scenario 10.5:
A firm produces garden hoses in California and in Ohio. The marginal cost of producing garden hoses in the two states and the marginal revenue from producing garden hoses are given in the following table:

California		Ohio			
Qc	MCc	Qo	MCo	Qc + o	MR
1	2	1	3	1	24
2	3	2	4	2	20
3	5	3	6	3	16
4	9	4	8	4	12
5	16	5	12	5	8
6	24	6	17	6	4

41) Refer to Scenario 10.5. From the perspective of the firm, what is the marginal cost of the 5th garden hose?
A) 4 B) 5 C) 16 D) 12 E) 8

Answer: B
Diff: 2
Section: 10.1

42) Refer to Scenario 10.5. How many garden hoses should be produced in California in order to maximize profits?
A) 1 B) 2 C) 3 D) 4 E) 5

Answer: C
Diff: 2
Section: 10.1

Scenario 10.6:
John is the manufacturer of red rubber balls (Q). He has a red rubber ball manufacturing plant in California, Florida and Montana. The total cost of producing red rubber balls at each of the three plants is given by the following table:

California		Florida		Montana	
Qc	TCc	Qf	TCf	Qm	TCm
1	5	1	8	1	4
2	10	2	16	2	8
3	15	3	24	3	12
4	20	4	32	4	16
5	25	5	40	5	20
6	30	6	48	6	24
7	35	7	56	7	28
8	40	8	64	8	32
9	45	9	72	9	36
10	50	10	80	10	40
11	infinity	11	infinity	11	infinity

43) Refer to Scenario 10.6. If red rubber balls can be produced at any of the three plants, what is the marginal cost of 5th red rubber ball?
A) 4
B) 5
C) 8
D) 20
E) none of the above

Answer: A
Diff: 2
Section: 10.1

44) Refer to Scenario 10.6. If red rubber balls can be produced at any of the three plants, and John decides to produce 1 red rubber ball, at which plant will he produce it?
A) California
B) Florida
C) Montana
D) He is indifferent between California and Florida.
E) He is indifferent between Florida and Montana.

Answer: C
Diff: 1
Section: 10.1

45) The demand curve and marginal revenue curve for red rubber balls are given as follows:

$Q = 16 - P \quad MR = 16 - 2Q$

What level of output maximizes profit?

A) 0
B) 4
C) 5.5
D) 6
E) B, C and D all maximize profit.

Answer: D
Diff: 3
Section: 10.1

46) What is the profit maximizing price?

A) 10
B) 20
C) 3
D) 40
E) none of the above

Answer: A
Diff: 1
Section: 10.1

47) At the profit–maximizing level of output, demand is

A) completely inelastic.
B) inelastic, but not completely inelastic.
C) unit elastic.
D) elastic, but not infinitely elastic.
E) infinitely elastic.

Answer: D
Diff: 2
Section: 10.1

48) Suppose that a tax of $2 per unit of output is imposed on red rubber ball producers. What level of output maximizes profit?

A) –1
B) 3
C) 4.5
D) 5
E) B, C, and D are correct.

Answer: D
Diff: 3
Section: 10.1

49) After the imposition of a tax of $2 per unit of output, what is the profit maximizing price?
A) 11
B) 21
C) 31
D) 41
E) none of the above

Answer: A
Diff: 1
Section: 10.1

Scenario 10.7:
The marginal revenue of green ink pads is given as follows:
MR = 2500 – 5Q
The marginal cost of green ink pads is 5Q.

50) Refer to Scenario 10.7. How many ink pads will be produced to maximize revenue?
A) 0
B) 250
C) 300
D) 500
E) none of the above

Answer: D
Diff: 2
Section: 10.1

51) Refer to Scenario 10.7. How many ink pads will be produced to maximize profit?
A) 50
B) 250
C) 500
D) 800
E) none of the above

Answer: B
Diff: 2
Section: 10.1

52) Refer to Scenario 10.7. Suppose that the firm chooses to produce 200 ink pads. At this level of output the demand for ink pads is
A) inelastic. B) unit elastic. C) elastic. D) unit elastic.

Answer: C
Diff: 1
Section: 10.1

53) The marginal cost of a monopolist is constant and is $10. The marginal revenue curve is given as follows:
MR = 100 – 2Q
The profit maximizing price is
A) $70. B) $65. C) $60. D) $55. E) $50.

Answer: D
Diff: 2
Section: 10.1

54) A multiplant firm has equated marginal costs at each plant. By doing this
A) profits are maximized.
B) costs are minimized given the level of output.
C) revenues are maximized given the level of output.
D) none of the above

Answer: B
Diff: 3
Section: 10.1

55) The _____ elastic a firm's demand curve, the greater its _____.
A) less; monopoly power
B) less; output
C) more; monopoly power
D) more; costs

Answer: A
Diff: 1
Section: 10.2

56) Monopoly power results from the ability to
A) set price equal to marginal cost.
B) equate marginal cost to marginal revenue.
C) set price above average variable cost.
D) set price above marginal cost.

Answer: D
Diff: 1
Section: 10.2

57) What is the value of the Lerner index under perfect competition?
A) 1
B) 0
C) infinity
D) two times the price

Answer: B
Diff: 1
Section: 10.2

58) The more elastic the demand facing a firm,
A) the higher the value of the Lerner index.
B) the lower the value of the Lerner index.
C) the less monopoly power it has.
D) the higher its profit.

Answer: B
Diff: 2
Section: 10.2

59) The Lerner index measures
A) a firm's potential monopoly power.
B) the amount of monopoly power a firm chooses to exercises when maximizing profits.
C) a firm's potential profitability.
D) an industry's potential market power.

Answer: B
Diff: 2
Section: 10.2

60) Assume that a firm's marginal cost is $10 and the elasticity of demand is −2. We can conclude that the firm's profit maximizing price is approximately
A) $20.
B) $5.
C) $10.
D) The answer cannot be determined without additional information.

Answer: A
Diff: 2
Section: 10.2

61) Use the following two statements to answer this question:
I. A firm can exert monopoly power if and only if it is the sole producer of a good.
II. The degree of monopoly power a firm possesses can be measured using the Lerner Index: L=(P − AC)/AC.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: D
Diff: 2
Section: 10.2

62) Suppose that the competitive market for rice in Japan was suddenly monopolized. The effect of such a change would be:
A) to decrease the price of rice to the Japanese people.
B) to decrease the consumer surplus of Japanese rice consumers.
C) to decrease the producer surplus of Japanese rice producers.
D) a welfare gain for the Japanese people.
E) increase the consumption of rice by the Japanese people.

Answer: B
Diff: 2
Section: 10.2

63) DVDs can be produced at a constant marginal cost of $10 per disk, and Roaring Lion Studios is releasing the DVDs for its last two major films. The DVD for *Rambeau 17* is priced at $20 per disk, and the DVD for *Schreck 10* is priced at $30 per disk. What are the Lerner indices for these two movies?
A) Both equal one.
B) 2 and 3, respectively
C) 0.5 and 0.67, respectively
D) 1 and 2, respectively

Answer: C
Diff: 2
Section: 10.2

64) DVDs can be produced at a constant marginal cost of $5 per disk, and Roaring Lion Studios is releasing the DVDs for its last two major films. The DVD for *Rambeau 17* is priced at $20 per disk, and the DVD for *Schreck 10* is priced at $30 per disk. What are the price elasticities of demand for these two movies?
A) Both equal −1.2.
B) −0.75 and −5/6, respectively
C) −1.33 and −1.2, respectively
D) −1.33 and −2, respectively

Answer: C
Diff: 2
Section: 10.2

65) DVDs can be produced at a constant marginal cost, and Roaring Lion Studios is releasing the DVDs for its last two major films. The DVD for *Rambeau 17* is priced at $20 per disk, and the DVD for *Schreck 10* is priced at $30 per disk. If the Lerner indices for *Rambeau 17* divided by the Lerner index for *Schreck 10* equals 0.5, what is the constant marginal cost of producing both DVDs?

A) MC = $10 B) MC = $15 C) MC = $20 D) MC = $5

Answer: B
Diff: 3
Section: 10.2

66) Roaring Lion Studios can produce DVDs at a constant marginal cost of $5 per disk, and the studio has just releasing the DVD for its latest hit film, *Ernest Goes to the Hamptons*. The retail price of the DVD is $25, and the elasticity of demand for this film is –2. Has the studio selected the profit–maximizing retail price for this DVD?

A) Yes
B) No, the retail price is too low
C) No, the retail price is too high
D) We do not have enough information to answer this question.

Answer: C
Diff: 2
Section: 10.2

67) Suppose Orange Inc. sells MP3 players and initially has monopoly power because there are only a few close substitutes available to consumers. As more types of MP3 players are introduced into the market, the demand facing Orange becomes _____ elastic and the Lerner index achieved by the firm in this market _____.

A) less, declines B) less, increases
C) more, declines D) more, increases

Answer: C
Diff: 2
Section: 10.3

68) Which of the following is NOT associated with a high degree of monopoly power?

A) A relatively inelastic demand curve for the firm
B) A small number of firms in the market
C) Significant price competition among firms in the market
D) Significant barriers to entry

Answer: C
Diff: 1
Section: 10.3

69) Which factors determine the firm's elasticity of demand?

A) Elasticity of market demand and number of firms
B) Number of firms and the nature of interaction among firms
C) Elasticity of market demand, number of firms, and the nature of interaction among firms
D) none of the above

Answer: C
Diff: 1
Section: 10.3

70) When a drug company develops a new drug it is granted a _____ making it illegal for other firms to enter the market until the _____ expires.
A) franchise; franchise
B) copyright; copyright
C) government license; government license
D) patent; patent

Answer: D
Diff: 1
Section: 10.3

71) The firms in a market have decided not to compete with one another and have agreed to limit output and raise price.
A) This practice is known as concentrating and is legal in the United States and Canada.
B) This practice is known as collusion and is illegal in the United States.
C) In this way firms take advantage of economies of scale.
D) This is an effective barrier to entry, but is illegal in the United States.

Answer: B
Diff: 2
Section: 10.3

72) Under which of the following scenarios is it most likely that monopoly power will be exhibited by firms?
A) When there are few firms in the market and the demand curve faced by each firm is relatively inelastic.
B) When there are many firms in the market and the demand curve faced by each firm is relatively inelastic.
C) When there are few firms in the market and the demand curve faced by each firm is relatively elastic.
D) When there are many firms in the market and the demand curve faced by each firm is relatively elastic.

Answer: A
Diff: 2
Section: 10.3

73) A manufacturer of digital music players uses a proprietary file format that is not used by the other firms in the market. This action by the firm may be an example of using a _____ to reduce the number of firms in the market and to maintain a relatively inelastic demand for its products.
A) natural monopoly
B) positive externality
C) subsidy
D) barrier to entry

Answer: D
Diff: 1
Section: 10.3

74) The cartel of oil–producing nations (OPEC) once controlled about 80% of the world petroleum market, but OPEC's market share has declined to about half of its former level. This outcome is a good example of how firms may have:
A) relatively high short–run monopoly power that strengthens in the long run.
B) relatively high short–run monopoly power that declines in the long run.
C) relatively low short–run monopoly power that strengthens in the long run.
D) relatively low short–run monopoly power that declines in the long run.

Answer: B
Diff: 1
Section: 10.3

75) Suppose there are seven firms in a market where the three largest firms supply 20% of the market–clearing quantity and the other four firms supply 10% of the market–clearing quantity. What is the five–firm concentration ratio (i.e., the share of total sales controlled by the five largest firms in the market)?
A) 60% B) 70% C) 80% D) 90%

Answer: C
Diff: 2
Section: 10.3

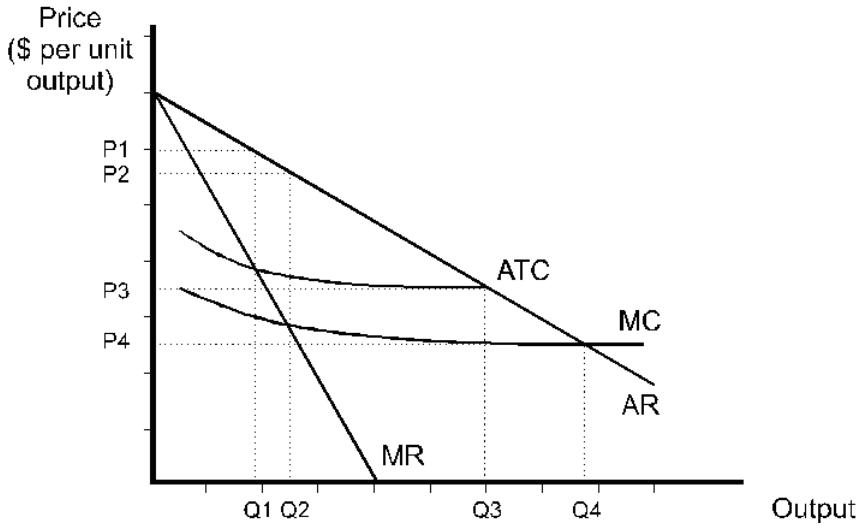


Figure 10.1

The revenue and cost curves in the diagram above are those of a natural monopoly.

76) Refer to Figure 10.1. If the monopolist is not regulated, the price will be set at _____.
A) P1
B) P2
C) P3
D) P4
E) none of the above

Answer: B
Diff: 1
Section: 10.4

77) Refer to Figure 10.1. Suppose that the government decides to limit monopoly power with price regulation. If the government sets the price at the competitive level, it will set the price at _____.

A) P1
B) P2
C) P3
D) P4
E) none of the above

Answer: D
Diff: 1
Section: 10.4

78) Refer to Figure 10.1. The minimum feasible price is _____.

A) P1
B) P2
C) P3
D) P4
E) none of the above

Answer: C
Diff: 1
Section: 10.4

79) With respect to monopolies, deadweight loss refers to the

A) socially unproductive amounts of money spent to obtain or acquire a monopoly.
B) net loss in consumer and producer surplus due to a monopolist's pricing strategy/policy.
C) lost consumer surplus from monopolistic pricing.
D) none of the above

Answer: B
Diff: 1
Section: 10.4

80) The regulatory lag:

A) always benefits the regulated firm.
B) is likely to occur with rate–of–return regulation.
C) promotes economic efficiency.
D) all of the above

Answer: B
Diff: 1
Section: 10.4

81) The monopolist that maximizes profit

A) imposes a cost on society because the selling price is above marginal cost.
B) imposes a cost on society because the selling price is equal to marginal cost.
C) does not impose a cost on society because the selling price is above marginal cost.
D) does not impose a cost on society because price is equal to marginal cost.

Answer: A
Diff: 1
Section: 10.4

82) Deadweight loss from monopoly power is expressed on a graph as the area between the
A) competitive price and the average revenue curve bounded by the quantities produced by the competitive and monopoly markets.
B) competitive price line and the marginal cost curve bounded by the quantities produced by competitive and monopoly markets.
C) competitive price line and the monopoly price line bounded by zero output and the output chosen by the monopolist.
D) average revenue curve and the marginal cost curve bounded by the quantities produced by competitive and monopoly markets.

Answer: D
Diff: 1
Section: 10.4

83) Which of the following is true when the government imposes a price ceiling on a monopolist?
A) Marginal revenue becomes horizontal.
B) Marginal revenue is linear.
C) Marginal revenue is kinked—horizontal and then downward sloping.
D) Marginal revenue is kinked—downward sloping and then horizontal.

Answer: C
Diff: 2
Section: 10.4

84) If the regulatory agency sets a price where AR = AC for a natural monopoly, output will be
A) equal to the competitive level.
B) equal to the monopoly profit maximizing level.
C) greater than the monopoly profit maximizing level and less than the competitive level.
D) greater than the competitive level.

Answer: C
Diff: 2
Section: 10.4

85) If a monopolist's profits were taxed away and redistributed to its consumers,
A) inefficiency would remain because output would be lower than under competitive conditions.
B) inefficiency would remain, but not because output would be lower than under competitive conditions.
C) efficiency would be obtained because output would be increased to the competitive level.
D) efficiency would be obtained because output would be increased and profits removed.

Answer: A
Diff: 2
Section: 10.4

86) Which of the following statements about natural monopolies is true?
A) Natural monopolies are only found in the markets for natural resources (like crude oil and coal).
B) For natural monopolies, marginal cost is always below average cost.
C) For natural monopolies, average cost is always increasing.
D) Natural monopolies cannot be regulated.

Answer: B
Diff: 2
Section: 10.4

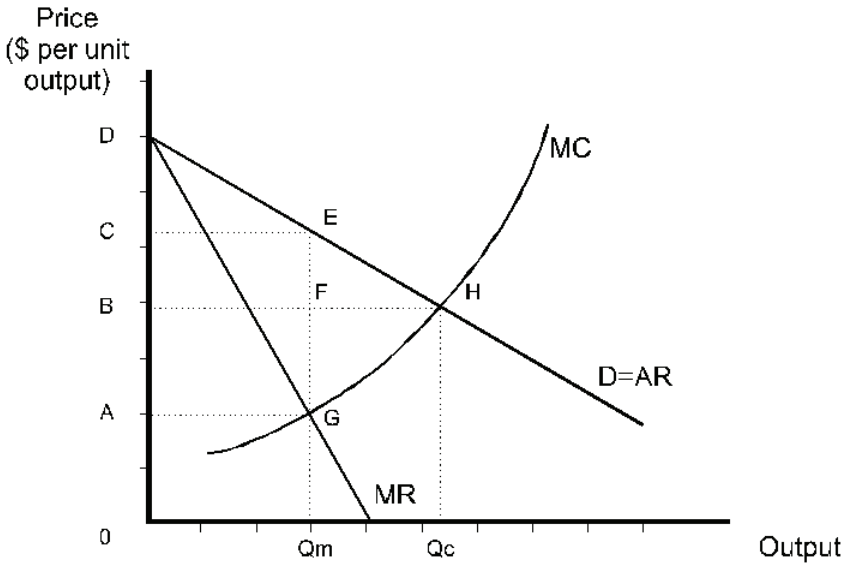


Figure 10.2

87) Refer to Figure 10.2. At output Qm, and assuming that the monopoly has set her price to maximize profit, the consumer surplus is:
A) CDE.
B) BDEF.
C) ADEG.
D) 0DEQm.
E) none of the above

Answer: A
Diff: 2
Section: 10.4

88) Refer to Figure 10.2. In moving from the competitive level of output and price to the monopoly level of output and price, the monopolist is able to add to producer surplus:
A) the area BCEF.
B) the area BCEF less the area GFH.
C) the area BCEH.
D) the area BCEH less the area GFH.
E) none of the above

Answer: B
Diff: 2
Section: 10.4

89) Refer to Figure 10.2. In moving from the competitive level of output and price to the monopoly level of output and price, the deadweight loss is the area:
A) QmEHQc.
B) GEH.
C) GFH.
D) FEH.
E) none of the above

Answer: B
Diff: 2
Section: 10.4

90) Use the following information to answer the next question:
The marginal cost of a monopolist is constant and is $10. The demand curve and marginal revenue curves are given as follows:
demand: $Q = 100 - P$
marginal revenue: $MR = 100 - 2Q$

The deadweight loss from monopoly power is _____.
A) $1000.00
B) $1012.50
C) $1025.00
D) $1037.50
E) none of the above

Answer: B
Diff: 3
Section: 10.4

Scenario 10.8:
Adriana is a monopolist producing green calculators. The average and marginal cost curves and average and marginal revenue curves for her product are given as follows:
$AC = Q + (10{,}000/Q)$ $MC = 2Q$ $AR = 30 - (Q/2)$ $MR = 30 - Q$

91) Refer to Scenario 10.8. Suppose that the regulatory agency sets your price where average revenue equals average cost. How much profit will Adriana make?
A) She will lose money and will go out of business.
B) She will break even.
C) She will make a profit.
D) none of the above

Answer: B
Diff: 1
Section: 10.4

92) Refer to Scenario 10.8. The deadweight loss from monopoly is _____.
A) 0
B) 5
C) 10
D) 25
E) none of the above

Answer: B
Diff: 3
Section: 10.4

Scenario 10.9:
Maui Macadamia Inc. has a monopoly in the macadamia nut industry. The demand curve, marginal revenue and marginal cost curve for macadamia nuts are given as follows:
P = 360 – 4Q MR = 360 – 8Q MC = 4Q

93) Refer to Scenario 10.9. What level of output maximizes the sum of consumer surplus and producer surplus?
A) 0
B) 30
C) 45
D) 60
E) none of the above

Answer: C
Diff: 2
Section: 10.4

94) Refer to Scenario 10.9. What is the profit maximizing level of output?
A) 0
B) 30
C) 45
D) 60
E) none of the above

Answer: B
Diff: 2
Section: 10.4

95) Refer to Scenario 10.9. At the profit maximizing level of output, what is the level of consumer surplus?
A) 0 B) 1,800 C) 2,700 D) 3,600 E) 4,800

Answer: B
Diff: 3
Section: 10.4

96) Refer to Scenario 10.9. At the profit maximizing level of output, what is the level of producer surplus?
A) 0 B) 1,800 C) 5,400 D) 7,200 E) 9,600

Answer: C
Diff: 3
Section: 10.4

97) Refer to Scenario 10.9. At the profit maximizing level of output, what is the deadweight loss?
A) 0
B) 450
C) 900
D) 1,800
E) none of the above

Answer: C
Diff: 3
Section: 10.4

98) The situation in which buyers are able to affect the price of a good is referred to as _____ power.
A) monopoly B) purchasing
C) monopsony D) countervailing

Answer: C
Diff: 1
Section: 10.5

99) For a competitive buyer, the marginal expenditure per unit of an input
A) exceeds the average expenditure per unit.
B) is less than the average expenditure per unit.
C) equals the average expenditure per unit.
D) any of the above could be true.

Answer: C
Diff: 1
Section: 10.5

100) Which of the following is true for a competitive buyer?
A) AE = ME B) AE > ME
C) AE < ME D) AE greater than or equal to ME

Answer: A
Diff: 1
Section: 10.5

101) For a monopsony buyer, the marginal expenditure per unit of an input
A) exceeds the average expenditure per unit.
B) is less than the average expenditure per unit.
C) equals the average expenditure per unit.
D) any of the above could be true.

Answer: A
Diff: 1
Section: 10.5

102) A monopsonist will buy _____ units of input than a competitor, and will pay _____ per unit.
A) fewer; less B) more; less C) fewer; more D) more; more

Answer: A
Diff: 1
Section: 10.5

103) Unlike a competitive buyer,
A) a monopsonist faces an upward–sloping industry supply curve.
B) a monopsonist pays a different price for each unit purchased.
C) a monopsonist sets marginal value equal to marginal expenditure.
D) the price that a monopsonist pays depends on the number of units purchased.

Answer: D
Diff: 2
Section: 10.5

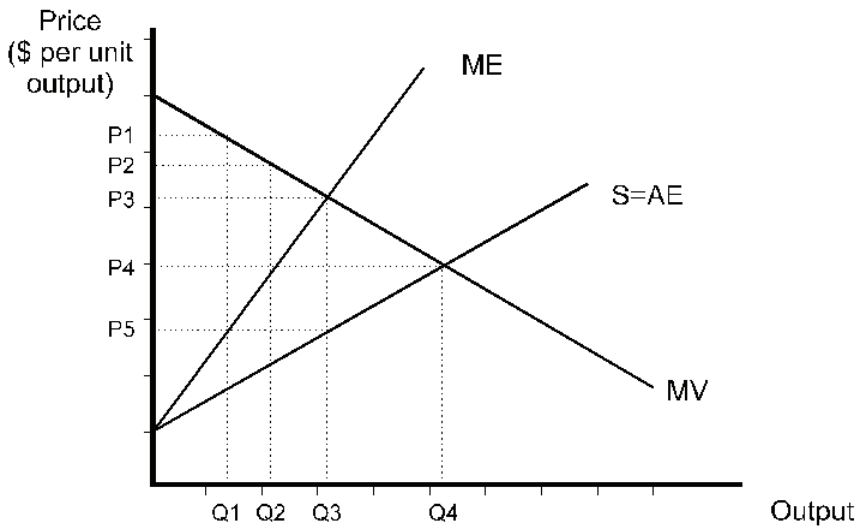


Figure 10.3

The marginal value curve and expenditure curves in the diagram above are those of a monopsony.

104) Refer to Figure 10.3. What quantity will the monopsonist purchase to maximize profit?
A) Q1
B) Q2
C) Q3
D) Q4
E) none of the above

Answer: C
Diff: 2
Section: 10.5

105) Refer to Figure 10.3. What price will the monopsonist pay when maximizing profit?
A) P1 B) P2 C) P3 D) P4 E) P5

Answer: E
Diff: 2
Section: 10.5

106) Refer to Figure 10.3. What quantity will be purchased in a competitive market?
A) Q1
B) Q2
C) Q3
D) Q4
E) none of the above

Answer: D
Diff: 2
Section: 10.5

107) Refer to Figure 10.3. What is the competitive price?
A) P1 B) P2 C) P3 D) P4 E) P5

Answer: D
Diff: 2
Section: 10.5

108) In an oligopsony market:
A) there are many buyers and sellers.
B) there are many buyers and a single seller.
C) there is a single buyer and many sellers.
D) there are a few buyers and many sellers.
E) there are a few buyers and a few sellers.

Answer: D
Diff: 2
Section: 10.5

109) In the personal computer market, some large manufacturers are able to buy computer components (e.g., disk drives, flat–screen monitors, and memory chips) and software at lower prices than smaller firms in the market. This outcome indicates that the large firms enjoy some degree of _____ in this market.
A) monopoly power B) oligopoly power
C) oligopsony power D) monopsony power

Answer: D
Diff: 2
Section: 10.5

110) Bridge Coal Company is the only employer in a remote and mountainous region of the country, so the firm is the monopsony buyer of labor in the market. If the price of coal increases, then the firm's:
A) ME curve shifts leftward. B) AE curve shifts rightward.
C) ME and AE curves shift rightward. D) MV curve shifts rightward.

Answer: A
Diff: 2
Section: 10.5

111) Bridge Coal Company is the only employer in a remote and mountainous region of the country, so the firm is the monopsony buyer of labor in the market. If the price of coal increases, then the firm's quantity of labor demanded _____ and the equilibrium wage _____.
A) decreases, decreases B) decreases, increases
C) increases, decreases D) increases, increases

Answer: D
Diff: 2
Section: 10.5

112) Bridge Coal Company is the only employer in a remote and mountainous region of the country, so the firm is the monopsony buyer of labor in the market. If the local population declines and there are fewer qualified coal miners available, which one of the curves used to determine the monopsony outcome in this market shifts?

A) MV curve
B) AE curve
C) ME curve
D) Both the ME and AE curves

Answer: D
Diff: 3
Section: 10.5

113) In a bilateral monopoly, equilibrium price will

A) favor the seller.
B) favor the buyer.
C) approximate the competitive equilibrium price.
D) not be determined by a simple rule.

Answer: D
Diff: 1
Section: 10.6

114) In a market with a bilateral monopoly:

A) there is a single buyer and a single seller.
B) there are many buyers and a single seller.
C) there is a single buyer and few sellers.
D) there are a few buyers and many sellers.
E) there are a few buyers and a few sellers.

Answer: A
Diff: 1
Section: 10.6

115) The degree of monopsony power that a firm enjoys is determined by

A) elasticity of market demand, elasticity of market supply, and number of buyers in the market.
B) elasticity of market supply, number of buyers in the market, and how buyers interact.
C) number of buyers in the market, how buyers interact, and number of sellers of the resource.
D) how buyers interact, number of sellers of the resource, and elasticity of market demand.

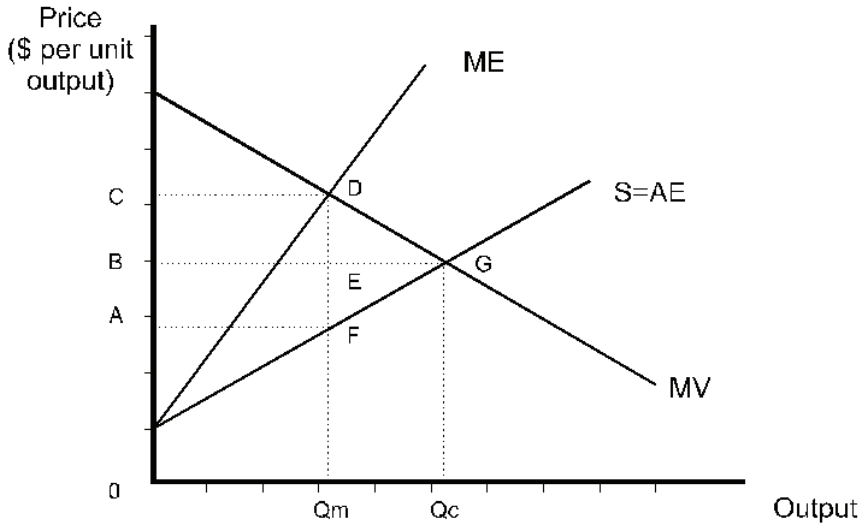
Answer: B
Diff: 2
Section: 10.6

116) The percentage "markdown" due to monopsony power is equal to _____.

A) (P – MC)/P
B) 1/ED
C) (MV – P)/P
D) P[1 + (1/ED)]

Answer: C
Diff: 2
Section: 10.6

117) The following diagram shows marginal value and expenditure curves for a monopsony. In moving from the competitive price and quantity to the monopsony price and quantity, the deadweight loss from monopsony power is the area:



A) ACDF B) CDE C) EDG D) FDG E) BCDG

Answer: D
Diff: 2
Section: 10.6

118) Use the following statements to answer this question:
I. If the market supply is perfectly elastic, then a few buyers with monopsony power can achieve the same percentage mark–down in the purchase price as a pure monopsonist.
II. The deadweight loss associated with a monopsony declines as the market supply curve becomes more elastic.

A) I and II are true. B) I is true and II is false.
C) II is true and I is false. D) I and II are false.

Answer: A
Diff: 2
Section: 10.6

119) In a bilateral monopoly with one buyer and one seller, the monopoly power of the seller and the monopsony power of the buyer tend to:

A) reinforce one another. B) counter–act one another.
C) favor the buyer. D) favor the seller.

Answer: B
Diff: 2
Section: 10.6

120) Large manufacturing firms that buy many different parts or components (e.g., auto manufacturers) can choose which parts to buy from other firms and which parts to make in their own factories. These manufacturers may be able to use monopsony power to reduce the price paid to outside suppliers for parts that are:
A) standard components for many manufacturers so that there are many buyers and sellers.
B) only used in their cars so that there is one buyer and a few sellers.
C) bought and sold in perfectly competitive markets.
D) none of the above

Answer: B
Diff: 2
Section: 10.6

121) Which of the following is NOT an example of buyer interaction that may improve the effectiveness of monopsony power?
A) Professional sports leagues that coordinate salary structures for players across the teams.
B) A buying cooperative in which members pool their purchases into one large order.
C) Labor unions that negotiate wage contracts for many workers who are employed by one firm.
D) All of the above are examples of buyer interaction in monopsonistic markets.

Answer: C
Diff: 3
Section: 10.6

122) Which of the following is true of the antitrust laws in the United States? They are
A) designed to make the business environment more equitable.
B) designed to promote a competitive economy.
C) deliberately written in a way to make clear to all what is and what is not allowed.
D) deliberately written in a language to promote cooperation among businesses.

Answer: B
Diff: 1
Section: 10.7

123) Predatory pricing is defined to be
A) collusive pricing.
B) behavior designed to drive out current competition.
C) cooperative behavior between two firms with monopoly power.
D) collusion.

Answer: B
Diff: 1
Section: 10.7

124) Which of the following is not an important antitrust law?
A) the Sherman Act of 1890
B) the Clayton Act of 1914
C) the Consumer Protection Act of 1932
D) the Federal Trade Commission Act of 1914
E) None of the above are antitrust laws.

Answer: C
Diff: 1
Section: 10.7

125) In 1982 the CEO of American Airlines spoke on the telephone to the CEO of Braniff Airlines. The CEO of American Airlines proposed that the two airlines fix prices. The CEO of Braniff Airlines rejected the proposal. The CEO of American Airlines:
A) was within his 1st Amendment right to free speech.
B) was in violation of the antitrust laws which prohibit price fixing.
C) was in violation of the antitrust laws which prohibit predatory pricing.
D) Both B and C are correct.
E) None of the above is necessarily correct.

Answer: E
Diff: 2
Section: 10.7

126) In some cases, firms that are accused of antitrust violations by federal authorities will plead guilty to the criminal charges in order to avoid facing the same charges in a private or civil trial. Why?
A) Attorneys in civil cases tend to be more effective at proving their claims.
B) The penalties for a conviction in a civil or private case are treble damages, or three times larger than the penalties in a criminal or public case.
C) Judges in criminal cases are known to be more lenient.
D) none of the above

Answer: B
Diff: 2
Section: 10.7

127) Use the following statements to answer this question:
I. Cartel activities like price fixing and other forms of collusion are never allowed under U.S. antitrust laws.
II. The Sherman Act applies to all firms that operate in U.S. markets, but the law does not apply to foreign governments.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: C
Diff: 2
Section: 10.7

128) A form of implicit collusion in which one firm consistently follows the actions of another firm is:
A) predatory pricing.
B) a Webb–Pomerene association.
C) parallel conduct.
D) only illegal in Europe.

Answer: C
Diff: 2
Section: 10.7

129) There are two satellite radio providers in the U.S. market, Sirius and XM Radio. The firms are proposed a merger, and it appears that the federal government will allow the merger to occur. Although the merger will create a single seller in this market, the existence of a monopoly may not have much impact on U.S. consumers. Which of the following statements are plausible reasons for the limited impact of the proposed merger?

A) There are very large fixed costs in providing satellite radio, and the industry may be a natural monopoly. One seller may be able to operate at lower cost than two sellers.

B) Although there will only be one seller of satellite radio, there are other forms of radio broadcasts available to U.S. consumers and demand for satellite radio may be relatively elastic.

C) The merged firm will operate at higher capacity and may be able to reduce costs through learning–by–doing, which will benefit U.S. consumers.

D) all of the above

Answer: D
Diff: 3
Section: 10.7

130) A firm's demand curve is given by P = 500 – 2Q. The firm's current price is $300 and the firm sells 100 units of output per week.

a. Calculate the firm's marginal revenue at the current price and quantity using the expression for marginal revenue that utilizes the price elasticity of demand.
b. Assuming that the firm's marginal cost is zero, is the firm maximizing profit?

Answer: ***a.***

Begin by calculating the price elasticity of demand, ED:

$$E_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

To find $\frac{\Delta Q}{\Delta P}$ solve for Q in terms of P.

$$P = 500 - 2Q$$
$$P - 500 = -2Q$$
$$Q = 250 - 0.5P$$

$$\frac{\Delta Q}{\Delta P} = -0.5;\ E_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$E_D = -0.5 \cdot \frac{300}{100} = -1.5$$

$$MR = P + P\left(\frac{1}{E_D}\right)$$

$$MR = 300 + 300\left(\frac{1}{-1.5}\right)$$

$$MR = 300 - 200 = 100$$

b.

If MC = 0, the firm is not maximizing profit since MR should be equal to MC. The firm should expand output.

$$MR = 500 - 4Q = 0$$
$$4Q = 500$$
$$Q = 125$$

Diff: 2
Section: 10.1

131) Determine the "rule–of–thumb" price when the monopolist has a marginal cost of $25 and the price elasticity of demand of –3.0.

Answer: Use equation (10.2) from the text, and solve for price.

$$P = \frac{MC}{1 + \frac{1}{E_D}} = \frac{\$25.00}{1 + \frac{1}{-3}} = \$37.50$$

Diff: 2
Section: 10.2

132) John Gardner is the city planner in a medium–sized southeastern city. The city is considering a proposal to award an exclusive contract to Clear Vision, Inc., a cable television carrier. Mr. Gardner has discovered that an economic planner hired a year before has generated the demand, marginal revenue, total cost and marginal cost functions given below:

$P = 28 - 0.0008Q$
$MR = 28 - 0.0016Q$
$TC = 120{,}000 + 0.00062$
$MC = 0.0012Q,$

where Q = the number of cable subscribers and P = the price of basic monthly cable service. Conditions change very slowly in the community so that Mr. Gardner considers the cost and demand functions to be reasonably valid for present conditions. Mr. Gardner knows relatively little economics and has hired you to answer the questions listed below.

a. What price and quantity would be expected if the firm is allowed to operate completely unregulated?
b. Mr. Gardner has asked you to recommend a price and quantity that would be socially efficient. Recommend a price and quantity to Mr. Gardner using economic theory to justify your answer.
c. Compare the economic efficiency implications of (a) and (b) above. Your answer need not include numerical calculations, but should include relevant diagrams to demonstrate deadweight loss.

Answer: ***a.***

Without regulation we would expect the firm to behave as a monopolist, equating MR and MC.

$$28 - 0.0016Q = 0.0012Q$$
$$Q = 10{,}000$$
$$P = 28 - 0.0008(10{,}000)$$
$$P = \$20$$

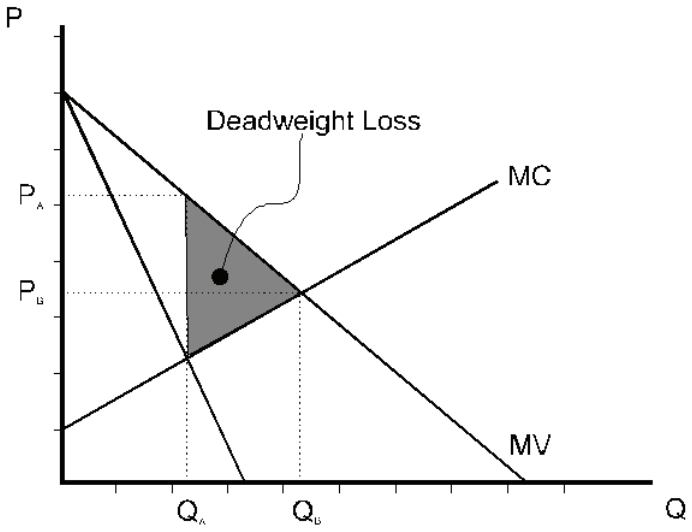
b.

Economic theory suggests that price should be equal to MC to achieve allocative efficiency.

$$P = 28 - 0.0008Q$$
$$MC = 0.0012Q$$
$$28 - 0.0008Q = 0.0012Q$$
$$28 = 0.002Q$$
$$Q = 14{,}000$$
$$P = 28 - 0.0008(14{,}000)$$
$$P = 28 - 11.20$$
$$P = 16.80$$

c.

In (a), the price is higher ($20 as opposed to $16.80), and quantity lower (10,000 as opposed to 14,000). The monopolist's higher price and smaller quantity result in a deadweight loss as shown below.



Diff: 2
Section: 10.4

133) A pure monopsony buyer of a resource pays a price P of $200.00 per unit purchased. The elasticity of supply ES of the resource is 4.0. What is the marginal value of the resource, MV, to the firm? Under what conditions would this firm have more monopsony power?

Answer: This problem can be solved by use of the following equation.

$$\frac{MV - P}{P} = \frac{1}{E_S}$$

$$\frac{MV - 200}{200} = \frac{1}{4}$$

$$MV = 250$$

The firm would have more monopsony power if the supply of the resource were less price elastic than that now given. Since this is a pure monopsonist, there can be no benefit from interaction with other buyers.

Diff: 2
Section: 10.6

134) The Metro Electric Company produces and distributes electricity to residential customers in the metropolitan area. This monopoly firm is regulated, as are other investor owned electric companies. The company faces the following demand and marginal revenue functions:

$P = 0.04 - 0.01Q$

$MR = 0.04 - 0.02Q$

Its marginal cost function is:

$MC = 0.005 + 0.0075Q,$

where Q is in millions of kilowatt hours and P is in dollars per kilowatt hour. Find the deadweight loss that would result if this company were allowed to operate as a profit maximizing firm, assuming that P = MC under regulation.

Answer: Find the area between the average revenue curve and the marginal cost curve that is bounded by the rates of production chosen first by the profit maximizing monopoly and second by the regulated industry having the same cost structure.

Monopoly output is denoted QM and is found where MC = MR.

$0.04 - 0.02Q = 0.005 + 0.0075Q$

$QM = 1.2727$ (in millions of KWH)

The regulated industry output takes place where average revenue equals marginal cost.

$$AR = \frac{R}{Q} = 0.04 - 0.01Q$$

$0.04 - 0.01Q = 0.005 + 0.0075Q$

$Q = 2$ (in millions of KWH)

The area representing deadweight loss is the area under the AR curve minus the area under the MC curve between Q = 2 and Q = 1.2727.

Area under AR is computed by first finding the heights of AR at the two quantities.

At $Q = 2$, $AR = 0.04 - 0.01(2) = 0.04 - 0.02 = 0.02$

At $Q = 1.2727$, $AR = 0.04 - 0.01(1.2727) = 0.04 - 0.012727 = 0.02727$.

$$\text{The average AR} = \frac{0.02 + 0.02727}{2} = 0.023636$$

$\text{Area} = (2 - 1.2727)(0.023636) = 0.01719$

The area under MC is

At $Q = 2$, $MC = 0.005 + 0.0075(2) = 0.02$

At $Q = 1.2727$, $MC = 0.005 + 0.0075(1.2727) = 0.014545$

$$\text{Average height} = \frac{0.02 + 0.014545}{2}$$

The area under MC is

$\text{Area} = (2 - 1.2727)(0.01727) = 0.01256$

$\text{Deadweight loss} = 0.01719 - 0.01256$

$= 0.00463$ in millions of dollars

= \$4,630 / time period.

Diff: 2
Section: 10.6

135) A pure monopsony buyer of a resource has a marginal value curve for the resource expressed as:

$MV = 100 - 0.4Q.$

Its marginal and average expenditure functions are:

$ME = 20 + 0.023Q$

$AE = S = 20 - 0.011Q.$

Compute the deadweight loss that results when the firm acts to maximize profit (that is, takes advantage of its monopsony power). Also, calculate the coefficient of monopsony power that this firm possesses and the elasticity of supply of the resource.

Answer: The deadweight loss is the area between the S and MV curves bounded by quantities purchased by the monopsonist QM and competitive buyers QC.

The Q_C is computed as follows:

Equate S to MV.

$$20 + 0.011Q = 100 - 0.4Q$$
$$0.411Q = 80$$
$$Q_C = 194.65$$

The QM is computed as follows:

Equate ME to MV.

$$20 + 0.023Q = 100 - 0.4Q$$
$$0.423Q = 80$$
$$Q_M = 189.13$$

Compute the average height of MV between QM and QC.

$H_M = 100 - 0.4(189.13) = 24.348$

$H_C = 100 - 0.4(194.65)$

$$\overline{H_1} = \frac{24.348 + 22.140}{2}$$

The area under the MV curve is A_M.

$$A_M = \left(\overline{H_1}\right)\left(Q_C - Q_M\right) = (23.24)(194.65 - 189.13)$$
$$A_M = 128.28$$

Compute average height of S = AE

$H_M = 20 + 0.011(189.13) = 22.08$

$H_C = 20 + 0.011(194.65) = 22.14$

$$\overline{H_2} = \frac{H_M + H_C}{2} = 22.11$$

The area under AE is AA.

$$A_A = \left(\overline{H_1}\right)\left(Q_C - Q_M\right) = (22.11)(194.65 - 189.13)$$
$$A_A = 122.05$$

Deadweight loss becomes $A_M - A_A = 128.28 - 122.05 = 6.23$

The coefficient of monopsony power is $\frac{MV - P}{P} = \frac{1}{E_S}$

$MV = 100 - 0.4[QM] = 100 - 0.4(189.13) = 24.35$

$P = 20 + 0.011[QM] = 20 + 0.011(189.13) = 22.08$

Coefficient of monopsony power $= \frac{24.35 - 22.08}{22.08} = 0.010.$

Elasticity of supply of the resource becomes

$$0.010 = \frac{1}{E_S}$$

$$E_S = 9.73$$

Diff: 2
Section: 10.6

136) Jeremy has a monopoly on jetski rentals on Peterson Lake. The demand function for jet ski rentals on Peterson Lake is: $Q_D = 160 - 2P \Leftrightarrow P = 80 - 0.5Q_D$. Use this information to fill in the table below. If Jeremy's marginal costs are constant at \$50, what price should he charge?

Q	P	TR	MR
27			
28			
29			
30			
31			

Answer:

Q	P	TR	MR
27	66.5	1,795.5	52.5
28	66	1,848	51.5
29	65.5	1,899.5	50.5
30	65	1,950	49.5
31	64.5	1,999.5	

If Jeremy's marginal costs are constant at \$50, he should charge \$65 per rental.

Diff: 1
Section: 10.6

137) Homer's boat manufacturing has a monopoly on boat sales in the region. Homer's marginal cost of the 8th boat produced is \$1,200. He produces only eight boats and can sell all eight boats for \$1,500. The elasticity of demand at this price is –2. Is Homer maximizing profits?

Answer: If Homer is maximizing profits, we know that the following must hold:

$P = \frac{MC}{1 + \left(1 / E_D\right)} \Rightarrow \frac{1{,}200}{1 - \frac{1}{2}} = 2{,}400 > P$. Since the rule of thumb relationship doesn't hold,

we know Homer is not maximizing profits.

Diff: 2
Section: 10.6

138) Trisha has a monopoly on formal gowns in the local market. She is currently charging $250 per gown and sells 20 in a month. The elasticity of demand is –1.5 at this price and output level. What must be Trisha's marginal cost of the last gown produced if she is maximizing profits?

Answer: If Trisha is maximizing profits we know: $P = \frac{MC}{1 + \left(1 / E_D\right)}$. We may solve this expression for marginal cost. That is, $MC = P\left\{1 + \left(\frac{1}{E_D}\right)\right\} \Rightarrow MC = 250\left\{1 + \left(\frac{1}{-1.5}\right)\right\} = 83\frac{1}{3}$.

Diff: 2
Section: 10.6

139) LeAnn's telecommunications firm has a monopoly in the local market. The elasticity of demand is –4 at every price (Note: Demand is not linear.). LeAnn's marginal costs are constant at $0.90. If LeAnn is maximizing profits, calculate the price she is charging. If the local community institutes a $0.10 tax on each unit LeAnn sells, calculate the new price LeAnn will charge consumers. What portion of the tax does LeAnn absorb?

Answer: The price LeAnn is charging is given by $P = \frac{MC}{1 + \left(1 / E_D\right)} \Rightarrow \frac{0.90}{1 - \frac{1}{4}} = \$1.20$. If a tax of $0.10 per unit is implemented, the new price LeAnn charges customers is: $P = \frac{MC + t}{1 + \left(1 / E_D\right)} \Rightarrow \frac{1}{1 - \frac{1}{4}} = \$1.33$. Thus, LeAnn raises prices by more than the amount of the tax. Thus, LeAnn doesn't absorb any of the tax in the price she receives.

Diff: 2
Section: 10.6

140) Tad's bait shop has a monopoly on the bait market at Sanderson's Lake. The demand curve for bait is $Q_D = 56 - 8P \Leftrightarrow P = 7 - \frac{1}{8}Q_D$. This implies the marginal revenue function is: $MR(Q) = 7 - \frac{1}{4}Q$. Tad has two employees he can use to search for bait. The marginal cost of using Amanda to search for bait is: $MC_M\left(Q_M\right) = \frac{1}{4}Q_M$. The marginal cost of using Andrew to search for bait is: $MC_N\left(Q_N\right) = \frac{3}{8}Q_N$. Determine how many units of bait each employee should gather. What is the price Tad receives for selling the bait?

Answer: We can think of Tad's employees as two different plants that Tad owns. We can then determine the individual plant supply and aggregate to determine Tad's total output. This is done as follows:

$MC_M\left(Q_M\right) = \frac{1}{4}Q_M \Rightarrow Q_M = 4MC_M$. Also, $MC_N\left(Q_N\right) = \frac{3}{8}Q_N \Rightarrow Q_N = \frac{8}{3}MC_N$. This implies that Tad's aggregate supply is: $Q = Q_M + Q_N = 4MC_M + \frac{8}{3}MC_N$. Since marginal costs will be equivalent across plants, $Q = \frac{20}{3}MC$. Tad's marginal cost as a function of output at both plants is: $MC(Q) = \frac{3}{20}Q$. Since Tad is a monopolist, he will set marginal revenue equal to marginal cost to determine optimal output. This is: $MC(Q) = \frac{3}{20}Q = MR(Q) = 7 - \frac{1}{4}Q \Rightarrow Q = 17.5$. At this output level, Tad's marginal cost is \$2.63. This means that Amanda is gathering 10.5 units of bait while Andrew gathers 7 units of bait. Tad receives \$4.81 per unit of bait.

Diff: 3
Section: 10.6

141) Silverscreen Movie Rentals has market power in the previously viewed video sales market. The demand curve for Silverscreen movies is $Q_D = 10 - 0.4P \Leftrightarrow P = 25 - 2.5Q$. Silverscreen's marginal revenue function is $MR(Q) = 25 - 5Q$. Silverscreen's marginal cost curve is MC(Q) = 0.53 + 0.026Q. Determine Silverscreen's profit maximizing price. Calculate Silverscreen's elasticity of demand at this price. What is Silverscreen's mark–up over marginal cost as a percentage of price?

Answer: Silverscreen's profit maximizing price occurs at the output level that sets marginal revenue equal to marginal cost.

MR(Q) = 25 – 5Q = MC(Q) = 0.53 + 0.026Q.

Hence we have Q = 4.87, and the profit maximizing price is \$12.83. The point–elasticity of demand is $E_D = \left(\frac{\Delta Q}{\Delta P}\right)\frac{P}{Q} = -0.4\left(\frac{12.83}{4.87}\right) = -1.05$. Silverscreen's mark–up over marginal cost is (P – MC)/P = (12.83 – 0.66)/12.83 = 0.95.

Diff: 2
Section: 10.6

142) T–Galaxy has market power in the market for Iowa State University Big XII Championship 2000 T–shirts. The demand for T–Galaxy's product is: $Q_D = 10 - 0.4P \Leftrightarrow P = 25 - 2.5Q_D$. The resulting marginal revenue curve is $MR(Q) = 25 - 5Q$. T–Galaxy's marginal costs are $MC(Q) = 3 + 6Q$. Determine T–Galaxy's profit maximizing price. Calculate T–Galaxy's elasticity of demand at this price. What is T–Galaxy's mark–up over marginal cost as a percentage of price?

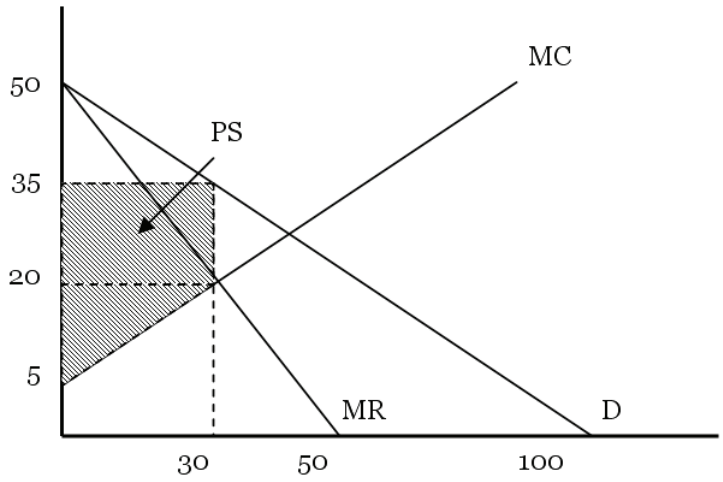
Answer: T–Galaxy's profit maximizing price occurs at the output level that sets marginal revenue equal to marginal cost. $MR(Q) = 25 - 5Q = MC(Q) = 3 + 6Q \Rightarrow Q = 2$. The profit maximizing price is \$20. The point–elasticity of demand is $E_D = \left(\frac{\Delta Q}{\Delta P}\right)\frac{P}{Q} = -0.4\left(\frac{20}{2}\right) = -4$. T–Galaxy's mark–up over marginal cost as a percentage of price is:

$(P - MC)/P = (20 - 15)/20 = 0.25$.

Diff: 2
Section: 10.6

143) Hawkins MicroBrewery has a monopoly on Oatmeal Stout in the local market. The demand is: $Q_D = 100 - 2P \Leftrightarrow P = 50 - \frac{1}{2}Q$. The resulting marginal revenue function is $MR(Q) = 50 - Q$. Hawkins marginal cost of producing Oatmeal Stout is $MC(Q) = 5 + \frac{1}{2}Q$. Calculate Hawkins profit maximizing output. Calculate the social cost of Hawkins monopoly power.

Answer: Hawkins will set marginal revenue equal to marginal cost to find optimal output. $MR(Q) = 50 - Q = MC(Q) = 5 + \frac{1}{2}Q \Rightarrow Q = 30$. At this output level, Hawkins charges \$35 per unit. The choke price is \$50 while Hawkins reservation price is \$5. Consumer surplus is $CS = \frac{1}{2}(50 - 35)30 = 225$. Producer surplus is $PS = 0.5(20 - 15)(30) + (35 - 20)(30) = 675$. Total surplus in the local Oatmeal Stout market is \$900 when Hawkins has monopoly power. If Hawkins did not have monopoly power, the price of Oatmeal Stout would equal Hawkins marginal cost. We can find this output level by setting consumer's price as a function of output equal to Hawkins marginal cost. $P = 50 - \frac{1}{2}Q = MC = 5 + \frac{1}{2}Q \Rightarrow Q = 45$. At this output level, the price of Oatmeal Stout is \$27.50. Consumer surplus is $CS' = \frac{1}{2}(50 - 27.50)45 = 506.25$. Producer surplus is $PS' = \frac{1}{2}(27.50 - 5)45 = 506.25$. Total surplus when Hawkins does not have monopoly power would be \$1,012.50. Thus, society loses 112.50 of surplus due to Hawkins' monopoly power in the local Oatmeal Stout market.



Diff: 2
Section: 10.6

144) McCullough has a monopoly on rental dwellings in the local community. The demand for rental dwellings is $Q_D = 70{,}000 - 50P \Leftrightarrow P = 1{,}400 - 0.02Q_D$. The resulting marginal revenue function is $MR(Q) = 1{,}400 - 0.04Q_D$. McCullough's marginal cost of providing rental dwellings is
$MC(Q) = 0.01Q + 20$. Suppose that to ease the burden on renters, the local community has instituted a price ceiling of \$480. Does consumer surplus increase due to this price ceiling? Does social welfare increase as a result of the price ceiling?

Answer: Before the price ceiling is imposed, McCullough was charging a price of \$832 per unit. Since McCullough has market power, we know that social welfare is less than it would be fore a competitive market. A competitive market sets price equal to marginal cost. At \$480, demand is 46,000. Marginal cost at 46,000 is exactly \$480. This means that the profit maximizing solution for McCullough is to provide 46,000 units at the price ceiling of \$480 per unit. Since the price equals marginal cost, the market enjoys the competitive market price. In this case, we know that societal welfare exceeds welfare in a monopoly market.

Diff: 2
Section: 10.6

Chapter 11 Pricing with Market Power

1) Which of the following strategies are used by business firms to capture consumer surplus?
   A) Price discrimination
   B) Bundling
   C) Two–part tariffs
   D) all of the above

Answer: D
Diff: 1
Section: 11.1

2) Rather than charging a single price to all customers, a firm charges a higher price to men and a lower price to women. By engaging in this practice, the firm:
   A) is trying to reduce its costs and therefore increase its profit.
   B) is engaging in an illegal activity that is prohibited by the Sherman Antitrust Act.
   C) is attempting to convert producer surplus into consumer surplus.
   D) is attempting to convert consumer surplus into producer surplus.
   E) Both A and C are correct.

Answer: D
Diff: 1
Section: 11.1

3) An electric power company uses block pricing for electricity sales. Block pricing is an example of
   A) first–degree price discrimination.
   B) second–degree price discrimination.
   C) third–degree price discrimination.
   D) Block pricing is not a type of price discrimination.

Answer: B
Diff: 1
Section: 11.2

4) When a firm charges each customer the maximum price that the customer is willing to pay, the firm
   A) engages in a discrete pricing strategy.
   B) charges the average reservation price.
   C) engages in second–degree price discrimination.
   D) engages in first–degree price discrimination.

Answer: D
Diff: 1
Section: 11.2

5) The maximum price that a consumer is willing to pay for each unit bought is the _____ price.
A) market
B) reservation
C) consumer surplus
D) auction
E) choke

Answer: B
Diff: 1
Section: 11.2

6) Second–degree price discrimination is the practice of charging
A) the reservation price to each customer.
B) different prices for different quantity blocks of the same good or service.
C) different groups of customers different prices for the same products.
D) each customer the maximum price that he or she is willing to pay.

Answer: B
Diff: 1
Section: 11.2

7) A firm is charging a different price for each unit purchased by a consumer. This is called
A) first–degree price discrimination.
B) second–degree price discrimination.
C) third–degree price discrimination.
D) fourth–degree price discrimination.
E) fifth–degree price discrimination.

Answer: A
Diff: 1
Section: 11.2

8) A tennis pro charges $15 per hour for tennis lessons for children and $30 per hour for tennis lessons for adults. The tennis pro is practicing
A) first–degree price discrimination.
B) second–degree price discrimination.
C) third–degree price discrimination.
D) fourth–degree price discrimination.
E) fifth–degree price discrimination.

Answer: C
Diff: 1
Section: 11.2

9) Discrimination based upon the quantity consumed is referred to as _____ price discrimination.
A) first–degree
B) second–degree
C) third–degree
D) group

Answer: B
Diff: 1
Section: 11.2

10) A doctor charges two different prices for medical services, and the price level depends on the patients' income such that wealthy patients are charged more than poorer ones. This pricing scheme represents a form of
A) first–degree price discrimination.
B) second–degree price discrimination.
C) third–degree price discrimination.
D) pricing at each consumer's reservation price.

Answer: C
Diff: 1
Section: 11.2

11) Third–degree price discrimination involves
A) charging each consumer the same two part tariff.
B) charging lower prices the greater the quantity purchased.
C) the use of increasing block rate pricing.
D) charging different prices to different groups based upon differences in elasticity of demand.

Answer: D
Diff: 1
Section: 11.2

12) The maximum price that a consumer is willing to pay for a good is called:
A) the reservation price.
B) the market price.
C) the first–degree price.
D) the block price.
E) the choke price.

Answer: A
Diff: 1
Section: 11.2

13) McDonald's restaurant located near the high school offered a Tuesday special for high school students. If high school students showed their student ID cards, they would be given 50 cents off any medium combination meal. This practice is an example of:
A) collusion.
B) price discrimination.
C) two–part tariff.
D) bundling.
E) tying.

Answer: B
Diff: 1
Section: 11.2

14) In 1994, the Walt Disney Corporation ran a special promotion on tickets to Disneyland. Residents of southern California who lived near the amusement park were offered admission at the special price of $22. Other visitors to Disneyland were charged about $30. This practice is an example of:
A) collusion.
B) price discrimination.
C) two–part tariff.
D) bundling.
E) tying.

Answer: B
Diff: 1
Section: 11.2

15) Some grocery stores are now offering customers coupons which entitle them to a discount on certain items on their next visit when they go through the check–out line. This practice is an example of:
A) intertemporal price discrimination.
B) third–degree price discrimination.
C) a two–part tariff.
D) bundling.
E) none of the above

Answer: B
Diff: 1
Section: 11.2

16) Which of the following is NOT a condition for third degree price discrimination?
A) Monopoly power
B) Different own price elasticities of demand
C) Economies of scale
D) Separate markets

Answer: C
Diff: 1
Section: 11.2

17) A third–degree price discriminating monopolist can sell its output either in the local market or on an internet auction site (or both). After selling all of its output, the firm discovers that the marginal revenue earned in the local market was $20 while its marginal revenue on the internet auction site was $30. To maximize profits the firm should
A) have sold more output in the local market and less at the internet auction site.
B) do nothing until it acquires more information on costs.
C) have sold less output in the local market and more on the internet auction site.
D) sell less in both markets until marginal revenue is zero.
E) sell more in both markets until marginal cost is zero.

Answer: C
Diff: 2
Section: 11.2

18) Suppose that the marginal cost of an additional ton of steel produced by a Japanese firm is the same whether the steel is set aside for domestic use or exported abroad. If the price elasticity of demand for steel is greater abroad than it is in Japan, which of the following will be correct?
A) The Japanese firm will sell more steel abroad than they will sell in Japan.
B) The Japanese firm will sell more steel in Japan than they will sell abroad.
C) The Japanese firm will sell steel at a lower price abroad than they will charge domestic users.
D) The Japanese firm will sell steel at a higher price abroad than they will charge domestic users.
E) Insufficient information exists to determine whether the price or quantity will be higher or lower abroad.

Answer: C
Diff: 2
Section: 11.2

19) You produce stereo components for sale in two markets, foreign and domestic, and the two groups of consumers cannot trade with one another. If your firm practices third–degree price discrimination to maximize profits, the marginal revenue
A) in the foreign market will equal the marginal cost.
B) in the domestic market will equal the marginal cost.
C) in the domestic market will equal the marginal revenue in the domestic market.
D) all of the above
E) none of the above

Answer: D
Diff: 2
Section: 11.2

20) You produce stereo components for sale in two markets, foreign and domestic, and the two groups of consumers cannot trade with one another. You will charge the higher price in the market with the
A) lower own price elasticity of demand (more inelastic demand).
B) higher own price elasticity of demand (more elastic demand).
C) larger teenage population.
D) greater consumer incomes.

Answer: A
Diff: 2
Section: 11.2

21) For a perfect first–degree price discriminator, incremental revenue is
A) greater than price if the demand curve is downward sloping.
B) the same as the marginal revenue curve if the firm is a non–discriminating monopolist.
C) equal to the price paid for each unit of output.
D) less than the marginal revenue for a non–discriminating monopolist.

Answer: C
Diff: 2
Section: 11.2

22) Suppose a firm produces identical goods for two separate markets and practices third–degree price discrimination. In the first market the firm charges $30 per unit, and it charges $22 per unit in the second market. Which of the following represents the ratio of price elasticities of demand in the two markets?
A) E2 = (21/29)E1
B) E2 = (29/21)E1
C) E2 = E1
D) E2 = (22/30)E1
E) none of these

Answer: E
Diff: 2
Section: 11.2

23) A firm sells an identical product to two groups of consumers, A and B. The firm has decided that third–degree price discrimination is feasible and wishes to set prices that maximize profits. Which of the following best describes the price and output strategy that will maximize profits?
A) PA = PB = MC.
B) MRA = MRB.
C) MRA = MRB = MC.
D) (MRA – MRB) = (1 – MC).

Answer: C
Diff: 2
Section: 11.2

24) Bindy, an 18–year–old high school graduate, and Luciana, a 40–year–old college graduate, just purchased identical hot new sports cars. Acme Insurance charges a higher rate to insure Bindy than Luciana. This practice is an example of:
A) collusion.
B) price discrimination.
C) two–part tariff.
D) bundling.
E) none of the above

Answer: E
Diff: 2
Section: 11.2

25) Under perfect price discrimination, marginal profit at each level of output equal
A) 0.
B) P – AC.
C) P – MC.
D) P – AR.

Answer: C
Diff: 2
Section: 11.2

26) Under perfect price discrimination, consumer surplus
A) is less than zero.
B) is greater than zero.
C) equals zero.
D) is maximized.

Answer: C
Diff: 2
Section: 11.2

27) When a monopolist engages in perfect price discrimination,
A) the marginal revenue curve lies below the demand curve.
B) the demand curve and the marginal revenue curve are identical.
C) marginal cost becomes zero.
D) the marginal revenue curve becomes horizontal.

Answer: B
Diff: 2
Section: 11.2

28) The manager of a firm is attempting to practice third degree price discrimination. She has equated the marginal revenue in each of her markets. By doing this her
A) profits are maximized.
B) costs are minimized given her level of output.
C) revenues are maximized given her level of output.
D) all of the above

Answer: C
Diff: 3
Section: 11.2

29) Your local grocery store offers a coupon that reduces the price of milk during the coming week. The regular retail price of milk in the store is $3.00 per gallon, and the coupon price is $2.00 per gallon for the next week. If the store maximizes profits and the price elasticity of demand for milk is –2 for coupon users, what is the price elasticity of demand for non–users?
A) –0.67
B) –1.0
C) –1.5
D) We do not have enough information to answer the question.

Answer: C
Diff: 2
Section: 11.2

30) When a company introduces new audio products, it often initially sets the price high and lowers the price about a year later. This is an example of
A) a two–part tariff.
B) second–degree price discrimination.
C) intertemporal price discrimination.
D) first–degree price discrimination.

Answer: C
Diff: 1
Section: 11.3

31) Club Med, which operates a number of vacation resorts, offers vacation packages at a lower price in the winter (i.e., the "off season") than in the summer. This practice is an example of:
A) peak–load pricing.
B) intertemporal price discrimination.
C) two–part tariff.
D) bundling.
E) Both A and B are correct.

Answer: E
Diff: 1
Section: 11.3

32) In peak–load pricing,
A) marginal revenue is equal in both periods.
B) marginal revenue in the peak period is greater than in the off–peak period.
C) marginal revenue in the peak period is less than in the off–peak period.
D) the sum of the marginal revenues is greater than the sum of the marginal costs.

Answer: B
Diff: 1
Section: 11.3

33) When the movie "Jurassic Park" debuted in Westwood, California, the price of tickets was $7.50. After several months the ticket price had fallen to $4.00. This is an example of
A) peak–load pricing.
B) second–degree price discrimination.
C) a two–part tariff.
D) tying.
E) none of the above

Answer: E
Diff: 2
Section: 11.3

34) The price of on–campus parking from 8:00 AM to 5:00 PM, Monday through Friday, is $3.00. From 5:00 PM to 10:00 PM, Monday through Friday, the price is $1.00. At all other times parking is free. This is an example of
A) bundling.
B) second–degree price discrimination.
C) a two–part tariff.
D) tying.
E) none of the above

Answer: E
Diff: 2
Section: 11.3

35) A local restaurant offers "early bird" price discounts for dinners ordered from 4:30 to 6:30 PM. This is an example of
A) peak–load pricing.
B) second–degree price discrimination.
C) a two–part tariff.
D) tying.
E) none of the above

Answer: A
Diff: 2
Section: 11.3

36) A local theater charges $5.00 for every matinee (daytime) ticket, but the ticket prices are much higher during the evening. This is an example of
A) peak–load pricing.
B) second–degree price discrimination.
C) a two–part tariff.
D) bundling.
E) none of the above

Answer: A
Diff: 2
Section: 11.3

37) What is the key characteristic of profit maximizing price discrimination that distinguishes intertemporal price discrimination from peak–load pricing?
A) Peak–load pricing does not require MC = MR.
B) Marginal revenue may be different across different groups of buyers under intertemporal price discrimination.
C) Marginal costs are independent across time periods under peak–load pricing.
D) Marginal revenue must be constant under both pricing schemes.

Answer: C
Diff: 2
Section: 11.3

38) If there are open first–class seats available on a particular flight, some airlines allow customers with coach (discount) tickets to upgrade to first–class tickets during the electronic check–in process. Suppose the regular price of a first–class ticket is $800, the total price of the upgrade ticket (original price plus the upgrade) is $400, the marginal cost of serving both types of customers (full–fare and upgrade first–class flyers) is $100, and the airline maximizes profits. Which of the following statements is true?
A) MR for the full–fare customers must be higher than the MR from upgrade customers.
B) MR for the full–fare customers may be higher or lower than the MR from upgrades.
C) MR = MC for the full–fare customers, but the airline is willing to collect any positive amount from the upgrade customers.
D) MR must be the same for both full–fare and upgrade customers.

Answer: D
Diff: 2
Section: 11.3

39) Automobile manufacturers commonly sell new car models at the full suggested retail price during the first few years the car is on the market, and they do not offer rebates or discounts. After the initial sales period, the manufacturers typically offer rebates or discounts on these models. The marginal cost of manufacturing the cars is constant across time. Which of the following statements is true?
A) The firms practice peak–load pricing by charging a higher price in the initial sales period.
B) Early buyers have higher reservation prices for the new models, and the manufacturers maximize profits by charging these buyers a higher price.
C) The marginal revenue from buyers who purchase these cars after the initial sales period must be lower that the marginal revenue from early buyers.
D) To maximize profits, the firms equate the buyers' reservation prices across time.

Answer: B
Diff: 2
Section: 11.3

40) An amusement park charges an entrance fee of $75 per person plus $2.50 per ride. This is an example of
A) first–degree price discrimination.
B) a two–part tariff.
C) second–degree price discrimination.
D) bundling.
E) tying.

Answer: B
Diff: 1
Section: 11.4

41) For most residential telephone service, people pay a monthly fee to have a hookup to the telephone company's line plus a fee for each call actually made. Under this pricing scheme, the telephone company is using
A) limit pricing.
B) a two–part tariff.
C) second–degree price discrimination.
D) two stage price discrimination.

Answer: B
Diff: 1
Section: 11.4

42) A pricing strategy that requires consumers pay an up–front fee plus an additional fee for each unit of product purchased is a
A) tying contract.
B) two–part tariff.
C) form of perfect price discrimination.
D) none of these.

Answer: B
Diff: 1
Section: 11.4

43) A national chain of bookstores has initiated a frequent buyer program. If you buy a frequent buyer card for $10, you are entitled to a 10 percent discount on all purchases for 1 year. This practice is an example of:
A) peak–load pricing.
B) intertemporal price discrimination.
C) two–part tariff.
D) bundling.
E) Both A and B are correct.

Answer: C
Diff: 1
Section: 11.4

44) A firm setting a two–part tariff with only one customer should set the entry fee equal to
A) marginal cost.
B) consumer surplus.
C) marginal revenue.
D) price.

Answer: B
Diff: 2
Section: 11.4

45) The local cable TV company charges a "hook-up" fee of $30 per month. Customers can then watch programs on a "pay-per-view" basis (a fee is charged for every program watched). This is an example of
A) peak-load pricing.
B) second-degree price discrimination.
C) a two-part tariff.
D) intertemporal price discrimination.
E) none of the above

Answer: C
Diff: 2
Section: 11.4

46) For a two-part tariff imposed on two consumers, the entry fee is based on the:
A) consumer surplus of the customer with lower willingness-to-pay.
B) consumer surplus of the customer with higher willingness-to-pay.
C) simple average of the consumer surplus for the two buyers.
D) none of the above

Answer: A
Diff: 1
Section: 11.4

47) Many cellular phone rate plans are structured as a combination of _____ price discrimination.
A) first-degree and second-degree
B) first-degree and third-degree
C) second-degree and third-degree
D) peak-load pricing and third-degree

Answer: C
Diff: 1
Section: 11.4

48) A firm has two customers and creates a two-part tariff with a usage fee (P) that exceeds the marginal cost of production and leaves each customer with positive consumer surplus such that CS2 > CS1 > 0. If the firm sets the entry fee equal to CS2, then the number of customers that actually buy the product is equal to:
A) zero.
B) one.
C) two.
D) We don't have enough information to answer this question.

Answer: B
Diff: 2
Section: 11.4

49) The pricing technique known as tying
A) permits a firm to meter demand.
B) permits a firm to practice price discrimination.
C) enables a firm to extend its monopoly power to new markets.
D) all of the above

Answer: D
Diff: 1
Section: 11.5

50) Season ticket holders for the St. Louis Rams received a surprise when they read the applications forms to renew their season tickets. In order to get their season ticket to the Rams' home games, they also had to buy tickets to the preseason games. Many season ticket holders grumbled about this practice as an underhanded way for the St. Louis Rams to get more money from its season ticket holders. This practice is an example of:
A) peak–load pricing.
B) intertemporal price discrimination.
C) two–part tariff.
D) bundling.
E) Both A and B are correct.

Answer: D
Diff: 1
Section: 11.5

51) A local restaurant sells strawberry pie for $3.00 per slice. However, if you order the prime rib dinner, you can get a slice of pie for only a dollar. This is an example of
A) bundling.
B) second–degree price discrimination.
C) a two–part tariff.
D) tying.
E) none of the above

Answer: A
Diff: 2
Section: 11.5

52) A local restaurant offers an "all–you–can–eat" salad bar for $3.49. However, with any sandwich, a customer can add the "all–you–can–eat" salad bar for $1.49. This is an example of
A) peak–load pricing.
B) second–degree price discrimination.
C) a two–part tariff.
D) tying.
E) none of the above

Answer: E
Diff: 2
Section: 11.5

53) Bundling products makes sense for the seller when
A) consumers have heterogeneous demands.
B) the products are complementary in nature.
C) firms cannot price discriminate.
D) both A and C.

Answer: D
Diff: 2
Section: 11.5

54) Bundling is effective when the demands for the bundled products are _____ and _____ correlated.
A) different; negatively
B) different; positively
C) similar; negatively
D) similar; positively
E) identical; perfectly

Answer: A
Diff: 2
Section: 11.5

55) Bundling raises higher revenues than selling the goods separately when
A) demands for two goods are highly positively correlated.
B) demands for two products are mildly positively correlated.
C) demands for two products are negatively correlated.
D) there is a perfect positive correlation between the demands for two goods.
E) the goods are complementary in nature.

Answer: C
Diff: 2
Section: 11.5

56) Mixed bundling is more profitable than pure bundling when
A) the marginal cost of each good being sold is positive.
B) the consumers' reservation values of each good being sold are not perfectly negatively correlated with one or another.
C) Both A and B are correct.
D) the marginal cost of one good is zero.

Answer: C
Diff: 2
Section: 11.5

57) Which of the following product pairs would NOT be good candidates for price discrimination through tying?
A) Razors and razor blades
B) Ink–jet printers and ink cartridges
C) Pencils and paper
D) Cellular telephones and cell phone service

Answer: C
Diff: 1
Section: 11.5

58) Albatross Software has two main products: WindSong is a program that can be used to edit audio files and SunBurst is a program that can be used to edit digital photos. The two major types of customers are small businesses and home users. The small business customers have a reservation price of $300 for WindSong and $450 for SunBurst. The home users have a reservation price of $100 for WindSong and $125 for SunBurst. Which of the following statements is true?

A) Bundling the two software products is not likely to be profitable because the marginal cost of producing software is positive by very small.
B) Bundling the two software products is not likely to be profitable because the consumer demands are homogeneous.
C) Bundling the two software products is likely to be profitable because the demands are negatively correlated.
D) Bundling the two software products is not likely to be profitable because the demands are positively correlated.

Answer: D
Diff: 1
Section: 11.5

59) One Guy's Pizza advertising expenditures are $1,200 and sales are $30,000. When the advertising expenditure increases to $1,400, pizza sales increase to $32,000. The arc advertising elasticity of demand is approximately _____.

A) 0 B) 0.1 C) 0.4 D) 2.5 E) 12.5

Answer: C
Diff: 2
Section: 11.6

60) A 10 percent decrease in advertising results in a 5 percent sales decrease. The advertising elasticity of demand is _____.

A) –2.0
B) –0.5
C) 0.5
D) 2
E) none of the above

Answer: C
Diff: 2
Section: 11.6

61) Use the following statements to answer this question.

I. To maximize profit, a firm will increase its advertising expenditures until the last dollar of advertising generates an additional dollar of revenue.

II. The full marginal cost of advertising is the sum of the dollar spent directly on advertising and the marginal production cost that results form the increased sales that advertising brings about.

A) Both I and II are true. B) I is true, and II is false.
C) I is false, and II is true. D) Both I and II are false.

Answer: C
Diff: 2
Section: 11.6

62) Use the following statements to answer this question.
I. To maximize profit, a firm will advertise more when the advertising elasticity is larger.
II. To maximize profit, a firm will advertise more when the price elasticity of demand is smaller.
A) Both I and II are true. B) I is true, and II is false.
C) I is false, and II is true. D) Both I and II are false.

Answer: A
Diff: 2
Section: 11.6

63) The price elasticity of demand for nursery products is –10. The advertising elasticity of demand is 0.4. Using the "Rule of Thumb for Advertising," the profit maximizing level of advertising will be set at _____ of sales.
A) 0.25 percent B) 0.4 percent C) 4 percent D) 40 percent

Answer: C
Diff: 2
Section: 11.6

64) Grocery store chains advertise more than convenience stores because:
A) the advertising elasticity of demand is smaller for grocery store chains than for convenience stores.
B) convenience stores have more elastic demand for their products than grocery store chains.
C) the advertising elasticity of demand for convenience stores is near zero and is much smaller than for grocery store chains.
D) all of the above
E) none of the above

Answer: C
Diff: 2
Section: 11.6

65) You interview with an athletic footwear manufacturer that has annual advertising expenditures of $32 million and total sales revenue of $100 million, and the firm selects the profit maximizing level of advertising expenditures. If the advertising elasticity of demand is 0.4, then you know that "Rule of Thumb for Advertising" implies that the demand for the firm 's products is:
A) inelastic. B) unit elastic. C) elastic. D) zero.

Answer: C
Diff: 2
Section: 11.6

66) We may be tempted to determine the optimal level of advertising expenditures at the point where the last dollar spent on advertising generates an additional dollar of sales revenue (i.e, the marginal revenue of advertising equals one). In general, this rule will not allow the firm to maximize profits because it ignores the:
A) price elasticity of demand.
B) marginal cost of additional sales generated by the advertising.
C) advertising–to–sales ratio.
D) fixed costs of advertising.

Answer: B
Diff: 2
Section: 11.6

67) Suppose we advertise up to the point where the last dollar spent on advertising generates an additional dollar of sales revenue (i.e, the marginal revenue of advertising equals one). If the full marginal cost of advertising is greater than one, then we will generate:
A) less output than the profit maximizing level.
B) more output than the profit maximizing level.
C) the profit maximizing level of output.
D) We don't have enough information to answer this question.

Answer: B
Diff: 3
Section: 11.6

68) The Acme Oil Company is a vertically integrated firm. It explores for and extracts crude oil. It also refines the crude oil into gasoline and other products, and sells these products to consumers. The internal price that Acme Oil uses when the crude oil that it extracts is "sold" to one of its refineries is called:
A) the shadow price.
B) the transfer price.
C) the market price.
D) the non–market price.
E) none of the above

Answer: B
Diff: 1
Section: Appendix for Chapter 11

69) The Acme Oil Company is a vertically integrated firm. It explores for and extracts crude oil. It also refines the crude oil into gasoline and other products, and sells these products to consumers. There are many other firms that extract and sell crude oil so that the market for crude oil is regarded by Acme Oil as competitive. The internal price that Acme Oil uses when the crude oil that it extracts is "sold" to one of its refineries:
A) equals the market price for crude oil.
B) equals the market price for crude oil less a discount because Acme Oil does not to profit from itself.
C) is unrelated to the market price of crude oil.
D) is greater than the marginal cost of extracting crude oil.

Answer: A
Diff: 3
Section: Appendix for Chapter 11

70) What is net marginal revenue?
A) The same as marginal profit.
B) The additional revenue the firm earns from an extra unit of an internally produced intermediate input.
C) The additional revenue the firm earns from producing one more unit of output.
D) The additional revenue the firm earns from selling one more unit of output.

Answer: B
Diff: 1
Section: Appendix for Chapter 11

71) What is the profit maximizing condition for a vertically integrated firm?
A) Net marginal revenue equals the sum of the marginal costs of the intermediate inputs.
B) Marginal revenue equals the marginal cost of the final output.
C) Net marginal revenue equals the marginal cost of each intermediate good.
D) The sum of net marginal revenues equals the marginal cost of the final output.

Answer: C
Diff: 1
Section: Appendix for Chapter 11

72) Halifax & Smyth (H&S) is a clothier that specializes in expensive men's suits, and the firm makes the suits from wool fabrics that are woven by one of the firm's divisions. This division is not the only source for this material, and H&S could buy or sell wool fabric in the outside competitive market. H&S will buy some of the wool fabric that it needs for suits from the outside market if the:
A) market price is less than the optimal transfer price if the outside market did not exist.
B) market price is less than the point where the net marginal revenue of weaving wool fabric intersects the marginal cost of wool fabric.
C) market price is less than the point where the net marginal revenue of assembling men's suits intersects the marginal cost of assembly.
D) Both A and B are correct.

Answer: D
Diff: 2
Section: Appendix for Chapter 11

73) Halifax & Smyth (H&S) is a clothier that specializes in expensive men's suits, and the firm makes the suits from wool fabrics that are woven by one of the firm's divisions. This division is the only source for this material, and H&S uses the optimal transfer price to determine the value of the wool fabric. What happens if the marginal cost of assembling the men's suits increases?
A) The net marginal revenue (NMR) curve for wool fabric shifts upward, and wool (suit) production increases.
B) The net marginal revenue (NMR) curve for wool fabric shifts upward, and wool (suit) production decreases.
C) The net marginal revenue (NMR) curve for wool fabric shifts downward, and wool (suit) production increases.
D) The net marginal revenue (NMR) curve for wool fabric shifts downward, and wool (suit) production decreases.

Answer: A
Diff: 2
Section: Appendix for Chapter 11

74) Calloway Shirt Manufacturers sells knit shirts in two sub–markets. In one sub–market, the shirts carry Calloway's popular label and breast logo and receive a substantial price premium. The other sub–market is targeted toward more price conscious consumers who buy the shirts without a breast logo, and the shirts are labeled with the name Archwood. The retail price of the shirts carrying the Calloway label is $42.00 while the Archwood shirts sell for $25. Calloway's market research indicates a price elasticity of demand for the higher priced shirt of –2.0, and the elasticity of demand for the Archwood shirts is –4.0. Moreover, the research suggests that both elasticities are constant over broad ranges of output.

a. Are Calloway's current prices optimal?
b. Management considers the $25 price to be optimal and necessary to meet the competition. What price should the firm set for the Calloway label to achieve an optimal price ratio?

Answer: Let P_C = Calloway price

P_A = Archwood price

E_C = Calloway elasticity

E_A = Archwood elasticity

a.

For an optimal price ration the following conditions must hold.

$$\frac{P_C}{P_A} \text{ must} = \frac{\left(1 + \frac{1}{E_A}\right)}{\left(1 + \frac{1}{E_C}\right)}$$

$$\frac{P_C}{P_A} \text{ must} = \frac{42}{25} = 1.68$$

$$\frac{\left(1 + \frac{1}{E_A}\right)}{\left(1 + \frac{1}{E_C}\right)} = \frac{\left(1 + \frac{1}{-4}\right)}{\left(1 + \frac{1}{-2}\right)} = \frac{\frac{3}{4}}{\frac{1}{2}} = \frac{3}{2} = 1.5$$

The current price is not optimal.

b.

If the elasticities are constant $\frac{P_C}{P_A}$ should equal 1.5.

P_A = $25, P_C should be $37.50

Diff: 2
Section: 11.2

75) American Tire and Rubber Company sells identical radial tires under the firm's own brand name and private label tires to discount stores. The radial tires sold in both sub–markets are identical, and the marginal cost is constant at $10 per tire for both types. The firm has estimated the following demand curves for each of the markets.

PB = 70 – 0.0005QB (brand name)

PP = 20 – 0.0002QP (private label).

Quantities are measured in thousands per month and price refers to the wholesale price. American currently sells brand name tires at a wholesale price of $28.50 and private label tires for a price of $17. Are these prices optimal for the firm?

Answer: To determine optimal prices MRA = MRB = MC. (This is acceptable because MC is constant.)

Setting MRB = MC

$70 - 0.001Q_B = 10$

$-0.001Q_B = -60$

$Q_B = 60{,}000$

$P_B = 70 - 0.0005(60{,}000) = \$40$

setting MRP = MC

$20 - 0.0004Q_P = 10$

$-0.0004Q_P = -10$

$Q_P = 25{,}000$

$P_P = 20 - 0.0002(25{,}000) = \$15$

PB = $40; PP = $15. Therefore the prices are not optimal.

Diff: 2
Section: 11.2

76) A lower east–side cinema charges $3.00 per ticket for children under 12 years of age and $5.00 per ticket for anyone 12 years of age or older. The firm has estimated that the price elasticity of demand for tickets purchased by those 12 years of age or older is –1.5. Calculate the elasticity of demand for tickets purchased for children under 12 years of age if prices are optimal.

Answer: Use equation as shown below. Let $P_1 = \$5.00$, $P_2 = \$3.00$, and E1 = –1.5

$$\frac{5}{3} = \frac{\left(1 + \frac{1}{E_2}\right)}{\left(1 + \frac{1}{-1.5}\right)}$$

$E_2 = -2.25$

Diff: 2
Section: 11.2

77) The local zoo has hired you to assist them in setting admission prices. The zoo's managers recognize that there are two distinct demand curves for zoo admission. One demand curve applies to those ages 12 to 64, while the other is for children and senior citizens. The two demand and marginal revenue curves are:

$P_A = 9.6 - 0.08Q_A$
$MR_A = 9.6 - 0.16Q_A$
$P_{CS} = 4 - 0.05Q_{CS}$
$MR_{CS} = 4 - 0.10Q_{CS}$

where PA = adult price, PCS = children's/senior citizen's price, QA = daily quantity of adults, and QCS = daily quantity of children and senior citizens. Crowding is not a problem at the zoo, so that the managers consider marginal cost to be zero.

a. If the zoo decides to price discriminate, what are the profit maximizing price and quantity in each market? Calculate total revenue in each sub–market.
b. What is the elasticity of demand at the quantities calculated in (a) for each market. Are these elasticities consistent with your understanding of profit maximization and the relationship between marginal revenue and elasticity?

Answer: ***a.***

Optimal price discrimination requires the zoo to set MRA = MRCS = MC.
Setting MRA = 0

$9.6 - 0.16Q_A = 0$
$9.6 = 0.16Q_A$
$Q_A = 60$

$P_A = 9.6 - 0.08(60)$
$P_A = \$4.8$
$MR_{CS} = 4 - 0.10Q_{CS} = 0$
$4 = 0.10Q_{CS}$
$Q_{CS} = 40$

$P_{CS} = 4 - 0.05(40) = \$2$
$P_{CS} = \$2$

$TR_A = P_A \cdot Q_A$
$TR_A = 4.8 \cdot 60 = \$288$

$TR_{CS} = P_{CS} \cdot Q_{CS}$
$TR_{CS} = 2 \cdot 40 = \$80$
$TR = 288 + 80 = \$368$

b.

To calculate elasticities, solve for Q.

$P_A = 9.6 - 0.08Q_A$
$P_A - 9.6 = -0.08Q_A$
$Q_A = 120 - 12.50P_A$

$Q_A = 120 - 12.5P_A$
$E_A = \frac{\Delta Q_A}{\Delta P_A} \cdot \frac{P_A}{Q_A}$

$$E_A = -12.50 \cdot \frac{4.8}{60}$$

$$E_A = \frac{-60}{60} = -1.0$$

$$P_{CS} = 4 - 0.05Q_{CS}$$

$$P_{CS} = 4 - 0.05Q_{CS}$$

$$P_{CS} - 4 = -0.05Q_{CS}$$

$$Q_{CS} = 80 - 20P_{CS}$$

$$E_{CS} = -20 \cdot \frac{2}{40}$$

$$E_{CS} = -1$$

Yes it is consistent. When MC = 0, profit maximization requires that MR = 0.

Diff: 3
Section: 11.2

78) The BCY Corporation provides accounting services to a wide variety of customers, most of whom have had a business association with BCY for more than five years. BCY's demand and marginal revenue curves are:

P = 10,000 – 10Q
MR = 10,000 – 20Q.
BCY's marginal cost of service is:
MC = 5Q.

a. If BCY charges a uniform price for a unit of accounting service, Q, what price must it charge per unit, and how many units must it produce per time period in order to maximize profit? Calculate the consumer surplus.
b. If BCY could enforce first–degree price discrimination, what would be the lowest price that it would charge and how many units would it produce per time period?
c. With perfect price discrimination and ignoring any fixed cost, what is total profit? How much additional consumer surplus is captured by switching from a uniform price to first–degree price discrimination?

Answer: ***a.***

Find where MC = MR, and then find P^* and Q^*.

$5Q = 10{,}000 - 20Q$
$25Q = 10{,}000$
$Q^* = 400$

At $Q^* = 400$, $P^* = 10{,}000 - 10(400) = \$6{,}000$. Consumer surplus is the area below AR and above P^*.

Area = 1/2 b • h = 1/2(b)(10,000 – P*) = 1/2(400)(4000) = $800,000

b.

The lowest price would occur where MC = AR.

$5Q = 10{,}000 - 10Q$
$15Q = 10{,}000$
$Q = 666.67$
$P^* = 10{,}000 - 10(666.67)$
$P^* = \$3{,}333.33$

c.

Profit is the area between AR and MC out to the intersection of AR and MC. Remember, we assume there are no fixed costs.

π = area under AR – area under MC.

Area under AR is computed as the average height of AR times the base.
At Q = 0, height = 10,000
At Q = 666.67, height = 3,333.33
Average height = 6,666.67
Base = 666.67
Area under AR = (666.67)(6,666.67) = $4,444,468.89

Area under MC is computed as a triangle.
At Q = 0, height = 0
At Q = 666.67, height = 5(666.67) = 3,333.33
Area under MC = (1/2)(666.67)(3,333.33) = 1,111,115.56

Total profit = $4,444,468.89 – 1,111,115.56 = $3,333,353.33
Loss in consumer surplus due to first–degree price discrimination is $800,000. See answer to part a above.

Diff: 2
Section: 11.2

79) The industry demand curve for a particular market is:

$Q = 1800 - 200P$.

The industry exhibits constant long run average cost at all levels of output, regardless of the market structure. Long run average cost is a constant \$1.50 per unit of output. Calculate market output, price (if applicable), consumer surplus, and producer surplus (profit) for each of the scenarios below. Compare the economic efficiency of each possibility.

a. Perfect Competition
b. Pure Monopoly (hint: $MR = 9 - 0.01Q$)
c. First Degree Price Discrimination

Answer: Since LAC is constant, LMC is also constant and equal to LAC. LMC = \$1.50

a.

Under perfect competition P = LMC. We begin by solving P as a function of Q:

$Q = 1800 - 200P$
$Q - 1800 = -200P$
$P = 9 - 0.005Q$

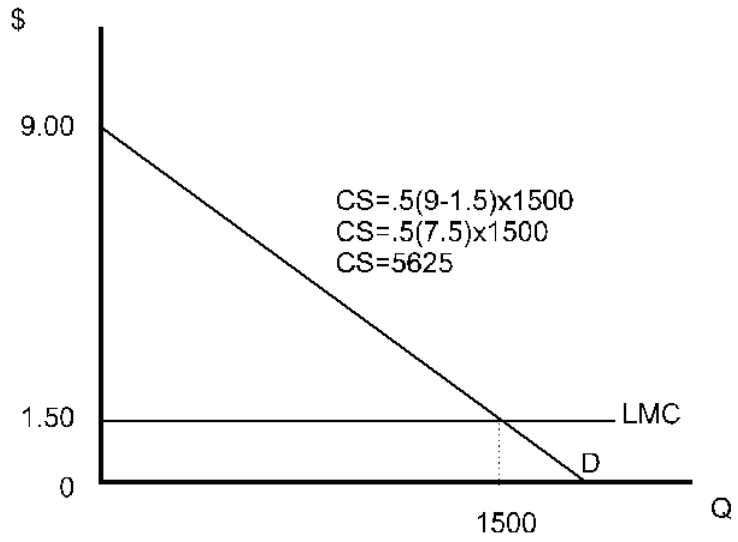
Under competition P = LMC

$9 - 0.005Q = 1.5$
$-0.005Q = -7.5$
$Q = 1500$

$P = 9 - 0.005(1500)$
$P = 9 - 7.5 = \$1.50$

P = LMC = LAC so that p (producer surplus) = 0

Consumer surplus is the area under the demand curve above market price, as indicated in the figure.



b.

Under monopoly MR = MC

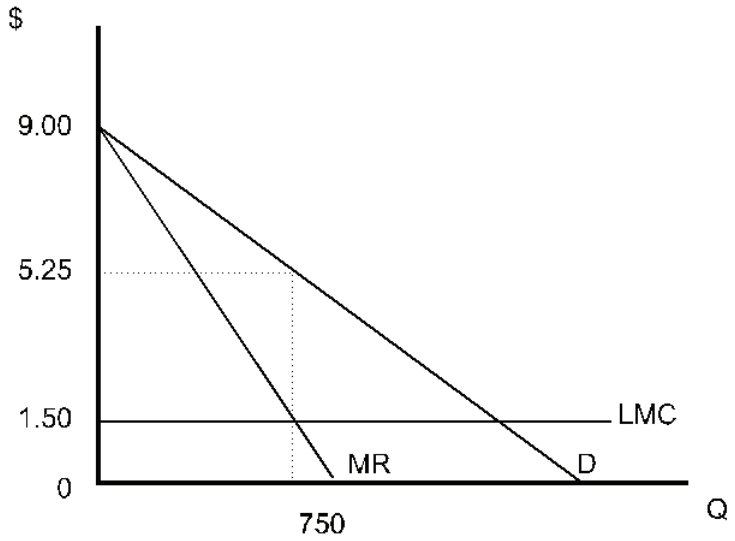
$P = 9 - 0.005Q$
$MR = 0 - 0.01Q$

Setting MR = MC

$9 - 0.01Q = 1.5$

$$-0.01Q = -7.5$$
$$Q = 750$$

$$P = 9 - 0.005(750)$$
$$P = 9 - 3.75$$
$$P = 5.25$$



$$\pi = (P - LAC) \times Q$$
$$\pi = (5.25 - 1.50) \times 750$$
$$\pi = 2812.50$$

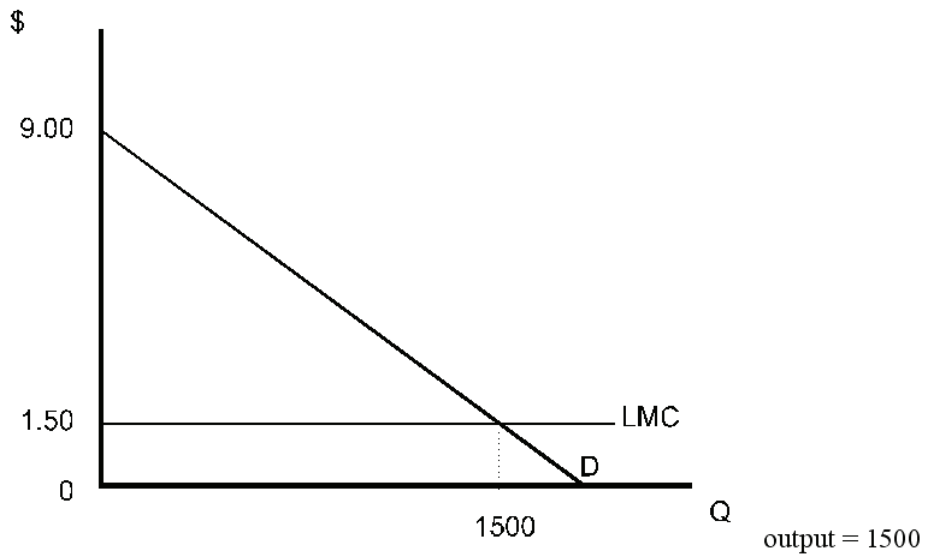
To find consumer surplus, find area of the triangle under the demand curve and above price.

$$CS = 9 - 5.25)(750)(0.5) = 1{,}406.25.$$

The sum of consumer surplus and producer surplus is 1,406.25 + 2,812.50 = 4,218.75.

c.

Under first–degree price discrimination–output is at the point where the demand curve cuts the LMC curve.



The firm charges the entire area under the demand curve.
PS = (9 – 1.5)(1,500)(0.5) = 5,625.
Comparison of Efficiency

a. Competition
   Consumer + Producer Surplus = 5,625
b. Monopoly
   Consumer + Producer Surplus = 4,218.75
c. First Degree
   Consumer + Producer Surplus = 5,625

Monopoly results in a deadweight loss. First–degree price discrimination results in a redistribution of income, but does not result in a deadweight loss.

Diff: 2
Section: 11.2

80) The Tire Shed is a regional chain that sells tires and other automobile parts. The company sells its own brand of tires under a block pricing scheme that charges $100 per tire if the customer buys one or two tires and $75 per tire if the customer buys three or four tires. The monthly demand curve facing the typical store is Q = 1000 — 4P, and the marginal cost of the tires is constant at $40 per tire.

a. What are the monthly profits for the typical store under the block pricing scheme? What is the consumer surplus enjoyed by customers of the typical store?
b. Suppose the firm is considering a uniform pricing scheme with P = $90 per tire. How does the firm profit and consumer surplus under uniform pricing compare to the profit and consumer surplus outcomes under block pricing?

Answer: a. The firm sells Q1 = 1000 — 4(100) = 600 tires at the high price (P1 = 100), and the firm's profit from the first block is 600(100 — 40) = $36,000. The demand curve may be stated in price–dependent form as P = 250 — 0.25Q, and the consumer surplus under the first block is CS1 = 600(250–100)/2 = $45,000. At the lower price, Q2 = 1000 — 4(75) = 700 (i.e., the typical Tire Shed sells 100 tires per month under the second block), the firm 's profit under this block is 100(75 — 40) = $3,500, and the total profit is $39,500 per month. The consumer surplus under the second block is CS2 = 100(100 — 75)/2 = $1,250, and the aggregate consumer surplus is $46,250 per month.

b. Under the uniform pricing scheme with P = $90, the quantity demanded is Q = 1000 — 4(90) = 640 tires per month, and the firm's profit is 640(90 — 40) = $32,000 per month. The consumer surplus under the uniform pricing scheme is CS = 640(250 — 90)/2 = $51,200 per month. As expected, the firm profits are higher and the consumer surplus is lower under the block pricing scheme.

Diff: 2
Section: 11.2

81) The Genetron Electric Company provides electric power service to a three state region in the US. The annual demand for electric power in this region is Q = 4500 — 100P where quantity (Q) is measured in millions of kilowatt hours (kWh) and the price (P) is cents per kWh. The firm operates in a decreasing cost industry.

a. If the firm's marginal cost curve crosses the demand curve at P = 4 (i.e., 4 cents per kWh), what is the quantity demanded at this price? Why wouldn't the firm want to operate under marginal cost pricing?
b. If the firm's average cost curve crosses the demand curve at P = 5, what is the quantity demanded at this price? What are the firm's profits under average cost pricing?
c. Suppose Genetron uses a block pricing scheme with prices P1 = 15, P2 = 10, and P3 = AC. What quantity levels are associated with the first, second, and third blocks of annual electricity demanded?

Answer: a. Under marginal cost pricing with P = 4, the annual quantity of electricity demanded in the region is Q = 4500 — 100(4) = 4,100 million kWh. Genetron would not want to produce under marginal cost pricing because the average cost of production is higher than the marginal cost (price) in a decreasing cost industry. Thus, the firm would face a certain loss under marginal cost pricing.
b. Under average cost pricing with P = 5, the annual quantity of electricity demanded in the region is Q = 4500 — 100(5) = 4,000 million kWh. Given that P = AC under this pricing scheme, Genetron would earn zero economic profits.
c. Under the first block price P1 = 15, the first block of quantity demanded is Q1 = 4500 — 100(15) = 3,000 million kWh. Under the second block price P2 = 10, the second block of quantity demanded is Q2 = 4500 — 100(10) = 3,500 million kWh (i.e., the second block runs from 3,000 to 3,500 kWh). Under the third block price P3 = AC = 5, the third block of quantity demanded is Q3 = 4500 — 100(5) = 4,000 million kWh (i.e., the third block runs from 3,500 to 4,000 kWh).

Diff: 2
Section: 11.2

82) The Catawba River City Park has a low demand D_1 during work days, but on Saturday and Sunday demand increases to D_2 on Saturday and Sunday. The demand and marginal revenue functions are:

$D_1 = P_1 = 2 - 0.001Q_1$

$MR_1 = 2 - 0.002Q_1$

$D_2 = P_2 = 20 - 0.01Q_2$

$MR_2 = 20 - 0.01Q_2$

where Q = number of cars entering the park each day. The marginal cost of operating the park is the same on weekdays and weekends:

$MC = 1 + 0.004Q$.

a. In order to control crowds, the park's management uses peak–load pricing. This scheme controls crowds and makes sure the park is self–supporting. Calculate the appropriate prices to charge, and determine the number of cars entering the park, Q_1 and Q_2.

b. Explain how switching from a uniform pricing scheme to a peak load pricing scheme affects the market.

Answer: ***a.***

Equate MC to MR_1, and the equate MC to MR_2. Compute P_1 and Q_1 and then P_2 and Q_2.

$1 + 0.004Q_1 = 2 - 0.002Q_1$

$0.006Q_1 = 1$

$Q_1 = 167$ cars per day

$P_1 = 2 - 0.001(167) = 2 - 0.167 = \$1.83$ per car

Now compute P_2 and Q_2 by the method above.

$1 + 0.004Q_2 = 20 - 0.02Q_2$

$0.024Q_2 = 1\ 9$

$Q_2 = 792$ cars per day

$P_2 = 20 - 0.01(792) = 20 - 7.92 = \$12.08$ per car.

b.

By switching from a uniform price to peak–load pricing, the firm can set MR equal to MC in each of the two periods. By keeping MR equal to MC in each period the firm can increase "profit". Since prices are closer to MC with peak–loading pricing, efficiency is increased. The sum of consumer and producer surplus is increased.

Diff: 2
Section: 11.3

83) Shooting Star Books is a small publishing company that specializes in science fiction books. Like most publishers, Shooting Star releases new books in hard-cover form and later releases paper-back versions of the books. The marginal cost of printing both types of books is $2 per book, and Shooting Star maximizes profits by practicing intertemporal price discrimination. The annual demand for recently released (hard-cover) books is Q1 = 400 — 10P1 where quantity demanded is measured in thousands of books and price is measured in dollars per book. The annual demand for the paper-back version of previously released books is Q2 = 800 — 40P2.

a. What are the marginal revenue curves associated with the two demand curves for books?
b. What are the profit maximizing prices for hard-cover and paper-back books? What are the quantities of books demanded at these prices for hard-cover and paper-back books?
c. Suppose the market demand for paper-back books shifts to Q2 = 150 — 100P2. How does this change affect the profit maximizing price and quantity in the paper-back book market? Does this change affect the profit maximizing outcome in the hard-cover book market?

Answer: a. The price-dependent forms of the demand curves are P1 = 40 — 0.1Q1 and P2 = 20 — 0.025Q2, and the associated marginal revenue curves are MR1 = 40 — 0.2Q1 and MR2 = 20 — 0.05Q2.

b. The profit maximizing output of hard-cover books is found by solving MC = MR1, which provides Q1 = (40 — 2)/0.2 = 190 thousand books. Based on the demand curve for these books, the optimal price is P1 = 40 — 0.1(190) = $21 per book. The profit maximizing output of paper-back books is then Q2 = (20 — 2)/0.05 = 360 thousand books, and the optimal price of these books is P2 = 20 — 0.025(360) = $11 per book.

c. Based on this shift in the demand curve, the new marginal revenue curve is MR2 = 1.5 — 0.02Q2. Given that the marginal cost exceeds the maximum reservation price for paper-back books, the company cannot profitably sell these books so that Q2 = 0. Further, the shift in demand for paper-back books does not affect the optimal price and quantity outcomes in the hard-cover book market.

Diff: 3
Section: 11.3

84) Travelers driving through Gotham City can use a freeway or the Cross Town Tollway to get through the city. The tollway charges $1.00 per car during the morning rush hour (6–9 AM) and the afternoon rush hour (4–7 PM), and the toll is $0.40 per car at all other times. The weekly demand for using the tollway during rush hour is Q1 = 800 — 200P1 where quantity demanded is measured in thousands of cars, and the weekly demand for the non–rush hour period is Q2 = 2000 — 1000P2. Gotham City's marginal cost of operating the tollway is MC = 0.02 + 0.001Q per car.

a. What are the marginal revenue curves associated with the two demand curves?
b. Has the city set the profit maximizing tolls for the Cross Town Tollway? If not, do the current tolls generate too much or too little traffic on the tollway?

Answer: a. The price–dependent expressions of the rush hour demand curve is P1 = 4 — 0.005Q1, and the expression for the non–rush hour demand is P2 = 2 — 0.001Q2. The associated marginal revenue curves are MR1 = 4 — 0.01Q1 and MR2 = 2 — 0.002Q2.
b. The profit maximizing level of rush hour traffic is found by solving MC = MR1, which provides 4 — 0.01Q1 = 0.02 + 0.001Q1 so that Q1 = 3.98/0.011 = 361.8 thousand cars. Accordingly, the profit maximizing price (toll) at this level of rush hour traffic is P1 = 4 — 0.005(361.8) = $2.19. The profit maximizing level of non–rush hour traffic is found by solving MC = MR2, which provides 2 — 0.002Q2 = 0.02 + 0.001Q2 so that Q2 = 1.98/0.003 = 660.0 thousand cars. Accordingly, the profit maximizing price (toll) at this level of non–rush hour traffic is P2 = 2 — 0.001(660) = $1.34. Thus, the current tolls are below the profit maximizing levels, and the tollway attracts more traffic than the optimal level during rush hour and non–rush hour periods.

Diff: 3
Section: 11.3

85) Customers attending basketball games at the local arena must pay for parking on the grounds and then pay for a ticket needed to enter the arena. If the arena manager knows that the customers' identical demands can be expressed collectively as

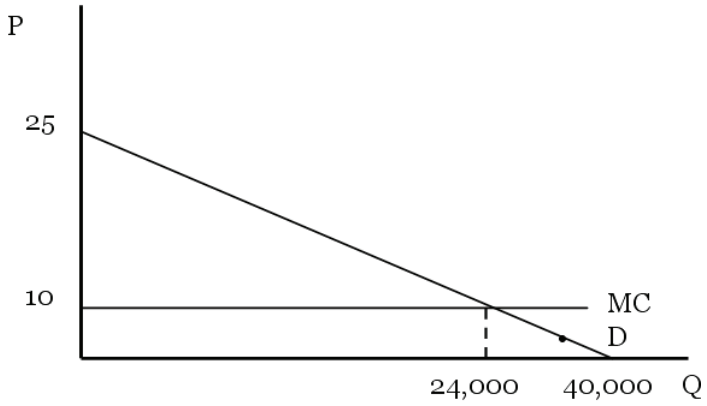
$$P = 25 - 0.000625Q$$

how much of a parking fee could the management collect if the marginal cost of providing entertainment were a constant MC = \$10 per seat?

Answer: Consider the parking fee to be the first part of a two-part tariff. The parking fee for the arena would be the entire consumer surplus.

Find the quantity at which the marginal cost curve intersects the demand curve:

Set $10 = 25 - 0.000625\ Q$
Then Q = 24,000
CS = (0.5)(24,000)(25 – 10) = 180,000
Then CS/Q = 180,000/24,000 = 7.50 which is the parking fee per customer.



Diff: 2
Section: 11.4

86) Merriwell Corporation has a virtual monopoly in the ultra high speed computer market. Merriwell has recently introduced a new computer that will be used by satellite installations around the world. The installations have identical demands for the computers. Merriwell's managers have decided to lease rather than sell the computer, but they have been unable to decide whether to use a single hourly rental charge or a two–part tariff. Under the two–part tariff, users would be levied an "access charge" plus an hourly rental rate. Merriwell's marketing staff estimates the demand and marginal revenue curves below for each potential user:

$P = 45 - 0.025Q$
$MR = 45 - 0.05Q,$

where P = price per hour of computer time, and Q = the number of hours of computer time leased per month. Merriwell offers their users extensive maintenance assistance and technical support. The firm's engineers estimate that marginal cost is $30 per computer hour.

a. Assuming that Merriwell chooses to set a single price, what are the firm's profit maximizing price and output?
b. Assuming that Merriwell uses a two–part tariff, what "access charge" and hourly rental fee should the firm set? Compare the firm's revenues under the options in (a) and (b).
c. Briefly describe how differing demand curves among the various buyers would alter the two–part tariff.

Answer: ***a.***

As a simple monopolist, the firm would set MR = MC

$45 - 0.05Q = 30$
$-0.05Q = -15$
$Q = 300$

$P = 45 - 0.025(300)$
$P = 45 - 7.5$
$P = 37.50$

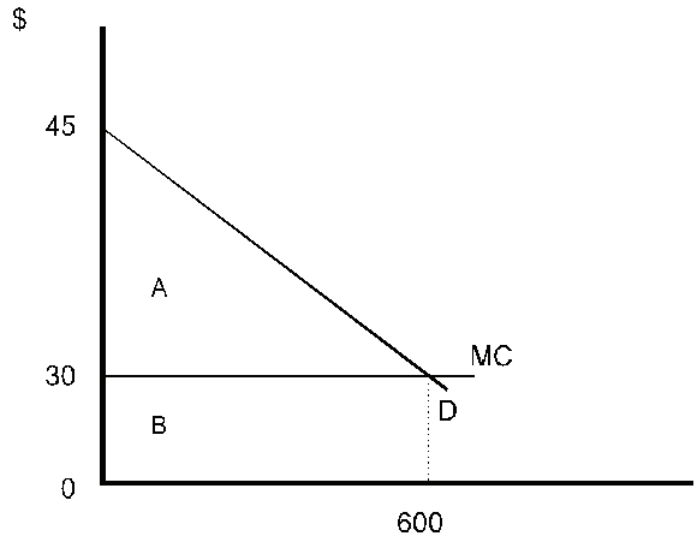
$TR = 37.50 \times 300 = \$11,250$

b.

Under a two–part tariff with identical consumers, price and output are determined where P = MC.

$45 - 0.025Q = 30$
$-0.025Q = -15$
$Q = 600$

$P = 45 - 0.025(600)$
$P = 30$



To find access charge, must find the consumer surplus which is area A.

Area A = CS = (0.5)(15)(600) = 4,500

Set access charge of $4,500 and a $30 hourly fee.

Total revenue under this option is the area under demand curve or $22,500. Total revenue doubles with a two–part tariff as compared with the single hourly rental charge option.

c.

With differing demands, the firm should set prices slightly above MC. The access charge should then be set to capture all consumer surplus from the buyer with the smallest demand.

Diff: 3
Section: 11.4

87) After graduation, you start an internet–based firm that allows people to buy and sell books online. Based on your market research, you believe there are two basic types of customers. The first type is the casual reader who has relatively low willingness–to–pay for your services, and their annual demand is Q1 = 30 – 40P where Q1 is the number of books traded per year and P is the price you charge per book traded. The second type of customer is the avid reader who has relatively high willingness–to–pay for your services, and their demand is Q2 = 100 – 50P. The marginal cost of your online service is $0.40 per book traded.

a. If you set your usage fee equal to the marginal cost, how many books will each type of customer trade on your system? What is the consumer surplus enjoyed by each type of customer?
b. What is the optimal entry fee that you should charge under a two–part tariff pricing scheme for access to your online market? How much consumer surplus is left for the two types of customers after they pay the entry fee and usage fee?

Answer: a. For the first group (casual readers), the quantity of book trading services demanded is Q1 = 30 — 40(0.40) = 14 books per year. The price–dependent demand curve for these customers is P = 0.75 — 0.025Q1, and the consumer surplus based on marginal cost pricing is CS1 = 14(0.75 — 0.40)/2 = $2.45 per year. For the second group (avid readers), the quantity of book trading services demanded is Q2 = 100 — 50(0.40) = 80 books per year. The price–dependent demand curve for these customers is P = 2 — 0.02Q2, and the consumer surplus based on marginal cost pricing is CS2 = 80(2 — 0.40)/2 = $64.00 per year.
b. The optimal entry fee equals the consumer surplus for the casual readers, which is $2.45 based on the results from part a. After this entry fee is imposed, the casual readers have zero consumer surplus remaining, and the avid readers have $61.55 consumer surplus remaining.

Diff: 3
Section: 11.4

88) Laughlin and Sons is a company that provides estate planning services to 100 wealthy clients. Although the clients have different wealth levels, their demands for the hourly estate planning services are identical. The aggregate annual demand for estate planning services facing Laughlin and Sons is Q = 20000 — 200P where Q is the total hours of estate planning services and P is the hourly rate charged for the services, and the firm's total cost of providing the estate planning services is TC = 80Q. The firm wants to establish a two-part tariff scheme for charging the clients, and the fees include an annual fixed retainer (entry fee) plus an hourly rate (usage fee).

a. What is the firm's marginal cost of providing estate planning services? What is the demand curve for a representative client?
b. What are the profit maximizing levels for the retainer and hourly rate? What is the firm's aggregate annual profit under the two-part tariff scheme?
c. Suppose Laughlin and Sons has a local monopoly on estate planning services. What are the profit maximizing hourly rate (price) and quantity under a single-price monopoly? How does the profit earned under the single-price monopoly compare to the profit earned under the two-part tariff scheme?

Answer: a. The marginal cost of production is the first derivative of the total cost function, and MC = $80 per hour. The demand curve for a representative client is q = Q/100 = 200 — 2P.
b. Under a two-part tariff scheme, the firm charges an hourly rate (P) equal to the marginal cost, P = $80 per hour. The quantity of estate planning services demanded at this hourly rate is q = 200 — 2(80) = 40 hours per year, and the aggregate quantity demanded is Q = 4,000 hours. The price-dependent version of the demand curve is P = 100 — 0.5q, and the consumer surplus for the representative client is CS = 40(100 — 80)/2 = $400 per year, which is the profit maximizing level for the retainer (entry fee). The firm's annual profit is 100(400) + 80(4,000) — 80(4,000) = $40,000.
c. The firm's marginal revenue curve is MR = 100 — 0.01Q. The firm's profit maximizing level of output (MR = MC) is Q = 2,000 hours per year, and the monopoly price is P = $90 per hour. Under the single-price monopoly, the firm's profit is 2,000(90 — 80) = $20,000, which is just half the profits earned under the two-part tariff scheme.

Diff: 3
Section: 11.4

89) Classic Programs has purchased distribution rights for two television programs that are ready for syndication. One series, The Detectives, was enormously popular during its prime time run and will command a large rental fee. The second series, Kittie and Alma, was a poor parody of a popular series. Kittie and Alma is not expected to be in demand for syndication. The managers at Classic Programs feel that there are only two legitimate bidders for the two series. One bidder is a large independent television station that is carried across the country by cable TV companies. The other bidder is a youth oriented pay TV network called Kidwork. The independent station and Kidwork are rarely carried by the same cable companies, so that a successful bid by one has almost no impact on the willingness of the other to show the programs. Based upon previous experience, Classic estimates the following reservation prices for each bidder. Bidding is for the right to show the programs on an unlimited basis.

	Independent Station	Kidwork
The Detectives	100,000	120,000
Kittie and Alma	15,000	8,000

a. Assuming that Classic's managers set separate prices for the two programs, what is the most profitable pricing strategy? (Because of information that is shared within the industry, different prices for the two bidders are impossible.) How much revenue will be earned?
b. Classic's managers are considering bundling the two programs under a single price. Is bundling feasible in this instance? Why or why not? If so, what should the bundled price be? What will total revenue be?

Answer: ***a.***

Separate prices must be set at the lower reservation price for each program. The Detectives would be priced at $100,000, Kittie and Alma at $8,000. Total revenue would be $216,000.

b.

Bundling is feasible because of the negative correlation between the firms' reservation prices (i.e., Kidwork has the greater demand for The Detectives, the independent station the greater demand for Kittie and Alma). The bundle price should be set equal to the lower reservation price for the bundled output. The independent station's reservation price is $115,000, Kidwork $128,000. The bundled price would be $115,000, providing total revenues of $230,000.

Diff: 2
Section: 11.5

90) Internet service in the local market is supplied by Laura's Internet Service. The demand is $Q_D = 6{,}500 - 100P \Leftrightarrow P = 65 - 0.01Q$. Laura's marginal cost function is

$$MC(Q) = 6.67 + 0.0067Q$$

If Laura practices first–degree price discrimination, what are consumer surplus and Laura's producer surplus in this market? Does Laura's market power and first–degree price discrimination result in reduced societal welfare?

Answer: If Laura can first–degree price discriminate, she will charge the highest price each consumer is willing–to–pay. This implies she will continue selling units until the price of the last unit sold equals her marginal cost.

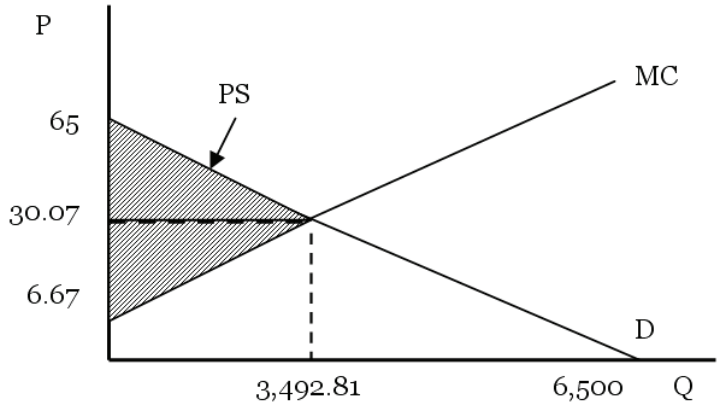
$$P = 65 - 0.01Q = MC = 6.67 + 0.0067Q$$

Therefore Q = 3,492.8

Producer surplus is

$$PS = (0.5)(65 - 6.67)(3{,}492.81) = 101{,}867.80$$

Since the price of the last unit sold is equal to the marginal cost, Laura's output level is efficient. However, since Laura is first–degree price discriminating, consumer surplus is zero. Social welfare in this market structure is as high as possible given the efficient level of units are produced.



Diff: 2
Section: 11.5

91) Internet service in the local market is supplied by Laura's Internet Service. Laura has two types of consumers. The first type of customers is local businesses, and their demand for internet service is $Q_D^B = 8{,}500 - 100P \Leftrightarrow P = 85 - 0.01\,Q_D^B$. The second type is residential customers, and their demand is $Q_D^R = 12{,}500 - 500P \Leftrightarrow P = 25 - \frac{Q_D^R}{500}$. Laura's marginal cost function is $MC\left(Q^B + Q^R\right) = \frac{20}{3} + \frac{Q^B + Q^R}{150}$. If Laura practices third–degree price discrimination and charges business customers \$35 and residential customers \$15, is Laura maximizing profits?

Answer: At a price of \$35, business customers will demand 5,000 units. At a price of \$15, residential customers will demand 10,000 units. If Laura is maximizing profits, $\frac{P^B}{P^R} = \frac{\left(1 + \frac{1}{E_D^R}\right)}{\left(1 + \frac{1}{E_D^B}\right)}$. The elasticity of residential demand is $E_D^R = \left(\frac{\Delta Q^R}{\Delta P^R}\right)\frac{P^R}{Q^R} = -500\left(\frac{15}{10{,}000}\right) = -0.75$. The elasticity of business demand is $E_D^B = \left(\frac{\Delta Q^B}{\Delta P^B}\right)\frac{P^B}{Q^B} = -100\left(\frac{35}{5{,}000}\right) = -0.70$. Plugging these values into the profit–maximizing rule, yields: $\frac{P^B}{P^R} = \frac{\left(1 - \frac{1}{3/4}\right)}{\left(1 - \frac{1}{7/10}\right)} = \frac{1/3}{3/7} = 7 \neq \frac{7}{3}$. Also, we know that a monopolist facing a linear demand curve will never operate where demand is inelastic. Clearly, Laura is not maximizing profits.

Diff: 3
Section: 11.5

92) Internet service in the local market is supplied by Laura's Internet Service. Laura has two types of consumers. The first type of customers is local businesses, and the elasticity of business demand at current prices and quantity is –1.25. The second type is residential customers, and the elasticity of residential demand at current prices and quantity is –4. Laura is charging business users $50 per unit of service while she charges residential customers $17.50 per unit. Can we determine if Laura is maximizing profits?

Answer: If Laura is maximizing profits, the equation $\frac{P^B}{P^R} = \frac{\left(1 + \frac{1}{E_D^R}\right)}{\left(1 + \frac{1}{E_D^B}\right)}$ must hold. Since $\frac{\left(1 + \frac{1}{E_D^R}\right)}{\left(1 + \frac{1}{E_D^B}\right)} = \frac{\left(1 - \frac{1}{4}\right)}{\left(1 - \frac{4}{5}\right)} = \frac{3}{4}(5) = \frac{15}{4} \neq \frac{50}{17.50} = \frac{P_B}{P_R}$, we know that Laura is not maximizing profits.

Diff: 3
Section: 11.5

93) Internet service in the local market is supplied by Laura's Internet Service. Laura has two types of consumers. The first type of customers is local businesses, and their demand for internet service is $Q_D^B = 6{,}500 - 100P \Leftrightarrow P = 65 - 0.01\,Q_D^B$. The resulting marginal revenue function for business customers is $MR\left(Q^B\right) = 65 - 0.02Q^B$. The second type is residential customers, and residential demand is $Q_D^R = 12{,}500 - 500P \Leftrightarrow P = 25 - \frac{Q_D^R}{500}$. The resulting marginal revenue function for residential customers is $MR\left(Q^R\right) = 25 - \frac{1}{250}Q^R$. Laura's marginal cost function is $MC\left(Q^B + Q^R\right) = \frac{20}{3} + \frac{Q^B + Q^R}{150}$. If Laura practices third-degree price discrimination, what are the profit maximizing prices she charges business and residential customers?

Answer: To maximize profits, Laura will choose the output levels where $MR^R = MR^B = MC$. This allows us to solve for business output as a function of residential output in the following manner. First, set $MR^B = MC$. This gives us: $MR^B = 65 - 0.02\mathrm{Q}^\mathrm{B} = \frac{20}{3} + \frac{Q^B + Q^R}{150} = MC \Leftrightarrow Q^B = 2{,}187.5 - 0.25Q^R$. We may then set $MR^R = MC$ and insert the information we derived above regarding business output. This yields: $MR^R = 25 - 0.004Q^R = \frac{20}{3} + \frac{2{,}187.5 + 0.75Q^R}{150} = MC \Leftrightarrow Q^R = 375$. This, in turn, implies that business output is 2,093.75. The optimal price charged to business customers is \$44.06 while the optimal price charged to residential customers is \$24.25.

Diff: 3
Section: 11.5

94) There are two types of consumers of X–box video game systems. The first type of consumer is highly eager to purchase the newest game systems. Their demand is $Q_D^N = 60{,}000 - 100P \Leftrightarrow P = 600 - 0.01\,Q_D^N$. The resulting marginal revenue function is $MR\left(Q^N\right) = 600 - 0.02Q^N$. After the first month the X–box systems are on the market, the first–type demand goes to zero at any price. The second type of consumer is more sensitive to price and will be the same one month after the systems are on the market. Their demand is $Q_D^W = 300{,}000 - 1{,}000P \Leftrightarrow P = 300 - 0.01\,Q_D^W$. The resulting marginal revenue function is $MR\left(Q^W\right) = 300 - 0.02\,Q^W$. The marginal cost to the manufacturers is constant at \$75. If the X–box manufacturer initially sets the system price at \$337.50, calculate their producer surplus. Do any second type customers purchase the X–box system at the initial release? Sometime after the initial release, the manufacturer lowers the price to \$187.50. If only the second type of customer purchases the system at this later date, calculate producer surplus from these sales. Why does the X–box manufacturer have an incentive to charge a high relative price at initial release and then lower the price considerably sometime later?

Answer: At a price of \$337.50, the first–type of consumers purchase 26,250 units. Producer surplus is $PS = 337.50(26{,}250) - 75(26{,}250) = 6{,}890{,}625$. At the initial price of \$337.50, no second type consumers purchase the X–box. When the manufacturer lowers the price to \$187.50, the second–type consumers purchase 112,500 systems. Producer surplus is $PS = 187.50(112{,}500) - 75(112{,}500) = 12{,}656{,}250$. This pricing strategy allows the manufacturer to capture more consumer surplus. This is intertemporal price discrimination. The incentive is larger profits.

Diff: 2
Section: 11.5

95) There are two types of consumers of High Definition Television (HDTV) sets. The first type of consumer is highly eager to purchase the sets. Their demand is

$Q_D^I = 60{,}000 - 10P \Leftrightarrow P = 6{,}000 - 0.1\,Q_D^I$. The resulting marginal revenue function is

$MR\left(Q^I\right) = 6{,}000 - 0.2Q^I$. After the first month the HDTV sets are on the market, the first–type demand goes to zero at any price. The second type of consumer is more sensitive to price and will be the same one month after the sets are on the market. Their demand is

$Q_D^{II} = 300{,}000 - 100P \Leftrightarrow P = 3{,}000 - 0.01\,Q_D^{II}$. The resulting marginal revenue function is

$MR\left(Q^{II}\right) = 3{,}000 - 0.02Q^{II}$. Suppose that the marginal cost of producing HDTV sets are constant at \$200. What pricing strategies might the manufacturer of HDTV sets consider to maximize profits?

Answer: The manufacturer of HDTV sets may engage in intertemporal price discrimination. That is, if the more price sensitive consumers will still be around later, the manufacturer may concentrate on the eager consumer market first. The manufacturer would then set $MR\left(Q^I\right) = 6{,}000 - 0.2Q^I = 200 \Rightarrow Q^I = 29{,}000$. At this level of output, the eager consumers are willing to pay \$3,100 per set. At this price, there will be no consumption from the second–type consumers. After maximizing profits in the initial period, the manufacturer could then concentrate on the second–type consumer. Assuming there are no first–type consumers leftover, the manufacturer would set $MR\left(Q^{II}\right) = 3{,}000 - 0.02Q^{II} = 200 \Rightarrow Q^{11} = 14{,}000$. At this level of output, the second–type consumers are willing to pay \$2,860. This intertemporal price discrimination allows the manufacturer to capture more consumer surplus.

Diff: 2
Section: 11.5

96) The demand for action figures based on characters from children's movies is extremely high around the time the movie is released. In this peak period, demand for action figures is

$Q_D^{pk} = 300{,}000 - 10{,}000P \Leftrightarrow P = 30 - 0.0002\,Q_D^{pk}$.

The resulting marginal revenue curve is $MR\left(Q^{pk}\right) = 30 - 0.0004Q^{pk}$. Some time after the movie release, interest in the action figures wanes. In this lull period, demand for the action figures becomes

$Q_D^I = 100{,}000 - 25{,}000P \Leftrightarrow P = 4 - 0.00008\,Q_D^I$. The resulting lull period marginal revenue curve is $MR\left(Q^I\right) = 4 - 0.00016Q^I$. Suppose the marginal costs of producing the action figures are constant at \$1.50. What is the optimal pricing strategy in the two different periods?

Answer: Optimal pricing in the period following the movie release is to set marginal revenue equal to marginal cost. $MR\left(Q^{pk}\right) = 30 - 0.0004Q^{pk} = 1.50 \Rightarrow Q^{pk} = 71{,}250$. The price consumers will pay in this peak period for each of these 71,250 units is \$15.75. In the lull period, optimal pricing will set: $MR\left(Q^I\right) = 4 - 0.00016Q^I = 1.50 \Rightarrow Q^I = 15{,}625$. The price consumers will pay in this lull period for each of the 15,625 units is \$2.75. This pricing strategy is intertemporal price discrimination.

Diff: 2
Section: 11.5

97) Bookstores often offer annual memberships that allow customers to purchase books at a 10% discount. Explain why this may increase profits of the bookstore.

Answer: This book club membership program is an example of a two–part tariff. If the consumer purchases a membership, they are able to purchase subsequent books at a discount to the price charged to non–members. This membership is in the best interest of the store's profits if the consumers increase purchases at the store. That is, the loss in profit margin due to the discount is offset by the membership fee and the increased number of book purchases. If the consumer will not purchases any more books than without the membership and saves money by joining the club, then bookstore profits are reduced. The bookstore must believe that joining the book club will induce the consumer to purchase books more frequently at the bookstore or the membership fee will exceed the customer's savings.

Diff: 2
Section: 11.5

98) Trisha's fashion boutique sells earrings and pendants. Trisha has two types of customers. Their willingness–to–pay for earrings and pendants are given in the table below. If Trisha bundles the earrings and pendants together, could she increase revenue?

	Earrings	**Pendant**
Type I	100	65
Type II	90	75

Answer: If Trisha bundles the products together and sells the bundle for $165, each of her customers will be willing to buy the bundle. Without bundling, Trisha would need to sell the earrings for $90 and the pendants for $65 in order to sell each customer both items. Thus, revenue from both items is $155 for each customer. Bundling increases Trisha's revenues by $10 per customer.

Diff: 1
Section: 11.5

99) Marge's Beauty Salon sells shampoo and conditioner. Marge has two types of customers. Their willingness–to–pay for shampoo and conditioner are given in the table below. If Marge bundles the shampoo and conditioner, could she increase revenue?

	Shampoo	**Conditioner**
Type I	8	5
Type II	6	8

Answer: If Marge bundles the products together and sells the bundle for $13, each of her customers will be willing to buy the bundle. Without bundling, Marge would need to sell the shampoo for $6 and the conditioner for $5 in order to sell each customer both items. Thus, revenue from both items is $11 for each customer. Bundling increases Marge's revenues by $2 per customer.

Diff: 1
Section: 11.5

100) The Sneed Snack Shop sells hamburgers and french fries. Given that there are 4 different types of customers whose willingness–to–pay are presented in the table below, give a pricing scheme that allows customers to buy combination meals and increases revenues for the Shop. The marginal cost of producing a hamburger is \$0.60 and the marginal cost of an order of fries is \$0.40.

	Fries	**Hamburger**
Type I	\$1.80	\$0.15
Type II	\$1.00	\$1.00
Type III	\$0.80	\$1.20
Type IV	\$0.10	\$1.80

Answer: The Snack Shop could charge \$1.80 for Hamburgers and \$1.80 for French Fries. The shop could then charge \$2.00 for a combination meal that bundles hamburgers and fries together.

Diff: 1
Section: 11.5

101) Jeremy's jet ski rentals can influence demand by advertising. Currently, Jeremy rents 30 jet skis per period. His advertising budget is \$250 per period. The advertising elasticity of demand is 1.25. The price elasticity of demand is –2. If we know that Jeremy is maximizing profits, calculate the price he must be charging per jet ski rental.

Answer: The advertising rule of thumb for profit maximization is

$$\frac{A}{PQ} = -\left(E_A / E_P\right) \Rightarrow \text{P} = -\frac{A}{Q}\left(E_P / E_A\right) = -\frac{250}{30}\left(-2/1.25\right) = 13\frac{1}{3}.$$

Diff: 2
Section: 11.5

102) Larry's Carpet Cleaners can influence demand by advertising. Larry charges \$50 per carpet, and he cleans 150 carpets per month. The price elasticity of demand is –4, and Larry spends \$500 per month on advertising. If Larry is maximizing profits, calculate the advertising elasticity of demand.

Answer: The advertising rule of thumb for profit maximization is

$$\frac{A}{PQ} = -\left(E_A / E_P\right) \Rightarrow E_A = -\frac{AE_P}{PQ} = -\frac{500(-4)}{50(150)} = \frac{1}{60}.$$

Diff: 2
Section: 11.5

103) Hawkins MicroBrewery can influence demand by advertising. Hawkins spends \$5,000 per period on advertising. The advertising elasticity of demand is 2. The price elasticity of demand is –1.5. Hawkins sells each unit for \$15. Given that Hawkins is maximizing profit, calculate the number of units sold.

Answer: The advertising rule of thumb for profit maximization is

$$\frac{A}{PQ} = -\left(E_A / E_P\right) \Rightarrow Q = -\frac{A}{Q}\left(E_P / E_A\right) = -\frac{5{,}000}{15}\left(-1.5/2\right) = 250.$$

Diff: 2
Section: 11.5

104) Your company sells health food products, and you have recently developed a new high–protein drink (HPD) as well as a high–carbohydrate energy bar (HCE). As the product manager for the firm, you are responsible for setting the pricing policy for the new products. You are considering a bundled package that includes both products, and you assume the marginal cost of production is zero for planning purposes. You have identified four basic types of consumers who may buy these new products, and their reservation prices for the two new products are provided in the following table:

Type	HPD	HCE
A	$0.50	$1.80
B	$0.80	$1.10
C	$1.00	$0.90
D	$1.40	$0.30

a. Suppose you sell the two products separately, and each buyer is expected to purchase one unit of the product per day. Which prices for HPD and HCE maximize daily revenue? What is your daily revenue from selling both products to the four customers under separate pricing?
b. If you offer the two products under a pure bundling strategy, what is the revenue maximizing bundle price? What is the daily sales revenue from the pure bundling scheme?
c. Please develop a mixed bundling strategy that generates higher daily sales revenue than the pure bundling strategy. What is the daily sales revenue generated under mixed bundling?

Answer: a. For HPD, you sell one unit at $1.40 (TR = $1.40), two units at $1.00 (TR = $2.00), three units at $0.80 (TR = $2.40), and four units at $0.50 (TR = $2.00). So, the maximum daily sales revenue is generated at the $0.80 price. For HCE, you sell one unit at $1.80 (TR = $1.80), two units at $1.10 (TR = $2.20), three units at $0.90 (TR = $2.70), and four units at $0.30 (TR = $1.20). So, the maximum daily sales revenue is generated at the $0.90 price, and the total revenue earned from selling both products separately is $5.10.
b. Under a pure bundling strategy, you would sell one package at $2.30 (TR = $2.30), three packages at $1.90 (TR = $5.70), and four packages at $1.70 (TR = $6.80). So, the pure bundling strategy with package price $1.70 is best and generates higher daily sales revenue than the separate pricing strategy.
c. For example, suppose you sell HPD at $1.40, HCE at $1.80, and the bundled package at $1.90. In this case, customers A–C purchase the bundle (TR = $5.70) and customer D buys HPD only (TR = $1.40), and the total daily sales revenue is $7.10.

Diff: 2
Section: 11.5

105) Cornucopia Media provides cable television service to several cities in the mid–Atlantic region. The firm has access to two new channels that focus on reality television programming, and the marginal cost of providing both new channels is zero. The first channel is Extreme Scottish Sports (ESS) and appeals to younger viewers, and the second channel is Delaware Entertainment and Tourism (DET) and appeals to older viewers. Based on Cornucopia's market research, younger viewers are willing to pay $5 per month for ESS, and their reservation price for DET is $0.50 per month. The same research indicates that older viewers have a reservation price of $1.00 per month for ESS and $4.00 per month for DET.

a. Please show how Cornucopia media can increase sales revenue by bundling the two channels rather than selling access to the channels separately.
b. The US Congress has recently considered legislation that would allow cable television subscribers to purchase access to separate channels (without bundling). If the law is enacted, what should we expect to happen to sales revenue in cable television markets?

Answer: a. Under separate pricing, Cornucopia would sell access to ESS at $5.00 per month and only subscribe younger viewers. Cornucopia would also sell access to DET at $4.00 per month and only subscribe older viewers. Under pure bundling, Cornucopia could sell the channel package at $5.00 per month, and all viewers would subscribe. Total sales revenue for the firm increases under the bundling scheme.
b. Based on the results from part a., we expect that total sales revenue from the cable television market to decline if the legislation is enacted by Congress.

Diff: 2
Section: 11.5

106) The Happy Mountain Brewing Company sells ground organic coffee in one pound containers through several grocery chains in the US. The marginal cost of production is constant at $4 per pound, and the advertising elasticity of demand is 0.2. The firm current spends $4 million per year on advertising and sells 4 million pounds of coffee per year.

a. What is the firm's full marginal cost of advertising?
b. Suppose the firm switches to a more effective advertising agency, and the advertising elasticity of demand increases to 0.3. What is the firm's new full marginal cost of advertising?
c. Suppose the firm was maximizing profits from advertising before the change, and the marginal revenue from an additional dollar of advertising remains the same after the change. Is the firm maximizing the profits generated from the advertising expenditures after the change? If not, how can the firm adjust its advertising expenditures to maximize profits?

Answer: a. Following the formula for the full marginal cost of advertising, we have MCA = 1 + MC(EA)(Q/A) where EA is the advertising elasticity of demand. By substitution, we have MCA = 1 + 4(0.2)(4/4) = $1.80 per dollar of advertising.
b. Using the formula above, we find that MCA = 1 + 4(0.3)(4/4) = $2.20 per dollar of advertising.
c. Given that MCA has increased, the marginal cost is now larger than the marginal revenue from an additional dollar of advertising, and the firm is no longer maximizing profits. The firm should reduce the amount of advertising expenditure, which increases the marginal revenue and decreases the full marginal cost of advertising, in order to maximize profits.

Diff: 2
Section: 11.6

107) Your family operates Voltaire's Pizza, which ships frozen hand–made pizzas by over–night delivery to homes within 500 miles of your city. You are asked to determine the optimal monthly advertising expenditures for the business. The total monthly cost of pizza production is $TC = 4Q + 0.0005Q^2 + A$ where A is the advertising expenditure. The firm's marginal revenue from advertising is constant at MRA = \$3, and the advertising elasticity of demand is 0.3.

a. What is the firm's marginal cost of production (MC)? What is the firm's full marginal cost of advertising (as a function of Q and A)?
b. Suppose you know the profit maximizing level of output is Q = 9,000 pizzas per month. What is the firm's optimal level of advertising expenditure?

Answer: a. The marginal cost of production is $MC = 4 + 0.001Q$. The full marginal cost of advertising is $MCA = 1 + MC(EA)(Q/A)$ where EA is the advertising elasticity of demand. By substitution, we find that $MCA = 1 + (4 + 0.001Q)(0.3)(Q/A) = 1 + 1.2Q/A + 0.0003Q^2/A$.
b. Given Q = 9,000, we have $MCA = 1 + 1.2(9000)/A + 0.0003(9000)^2/A = 1 + 35{,}100/A$. To maximize the profits from advertising at this level of output, we find the value of A at which MRA = MCA. Here, we have $3 = 1 + 35{,}100/A$, which provides the optimal advertising expenditure at $A = 35{,}100/2 = \$17{,}550$ per month.

Diff: 3
Section: 11.6

108) The Happy Mountain Brewing Company sells ground organic coffee in one pound containers through several grocery chains in the US. The firm has two divisions: the roasting division buys raw organic coffee beans and then blends, roasts, and grinds the beans, and the merchandising division packages and distributes the ground coffee.

a. Please draw a carefully labeled figure that illustrates the optimal transfer pricing policy for the firm if there is no outside market and the firm is a monopoly seller (i.e., there are no other sellers of ground organic coffee). In particular, please show the optimal transfer price that is paid to the roasting division, the optimal retail price charged by the merchandising division, and the optimal amount of coffee sold.
b. Suppose poor weather conditions in South American increase the price of raw coffee beans. How does this affect the marginal cost curve for the roasting division? Does this also affect the marginal cost of merchandising (packaging and distribution)? How do the optimal transfer price, retail coffee price, and quantity sold change due to this weather problem?

Answer: a. The figure should be structured like Figure A11.1 in the text. In this case, the optimal quantity of coffee is determined where the marginal cost of roasted coffee intersects the net marginal revenue curve, and the optimal transfer price is also determined at this point of intersection. The optimal retail price of coffee is determined by the market demand curve at the optimal quantity of coffee production.
b. Under this scenario, the marginal cost of roasted coffee shifts upward, and the marginal cost of merchandising does not shift. Accordingly, the net marginal revenue curve does not shift, but the optimal quantity of coffee production declines due to the upward shift in the marginal cost of roasting. The optimal transfer price for roasted coffee increases, and the optimal retail price of coffee also increases due to the decline in the profit maximizing quantity of coffee.

Diff: 2
Section: Appendix for Chapter 11

Chapter 12 Monopolistic Competition and Oligopoly

1) For which of the following market structures is it assumed that there are barriers to entry?
   A) Perfect competition
   B) Monopolistic competition
   C) Monopoly
   D) all of the above
   E) B and C only

Answer: C
Diff: 1
Section: 12.1

2) Use the following two statements about monopolistic competition to answer this question.
   I. In the long run, the price of the good will equal the minimum of the average cost.
   II. In the short run, firms may earn a profit.
   A) I and II are true.
   B) I is true, and II is false.
   C) I is false, and II is true.
   D) I and II are false.

Answer: C
Diff: 1
Section: 12.1

3) A market with few entry barriers and with many firms that sell differentiated products is
   A) purely competitive.
   B) a monopoly.
   C) monopolistically competitive.
   D) oligopolistic.

Answer: C
Diff: 1
Section: 12.1

4) The most important factor in determining the long-run profit potential in monopolistic competition is
   A) free entry and exit.
   B) the elasticity of the market demand curve.
   C) the elasticity of the firm's demand curve.
   D) the reaction of rival firms to a change in price.

Answer: A
Diff: 1
Section: 12.1

5) Which of the following is NOT regarded as a source of inefficiency in monopolistic competition?
   A) The fact that price exceeds marginal cost
   B) Excess capacity
   C) Product diversity
   D) The fact that long-run average cost is not minimized
   E) all of the above

Answer: C
Diff: 1
Section: 12.1

6) Monopolistically competitive firms have monopoly power because they
A) face downward sloping demand curves.
B) are great in number.
C) have freedom of entry.
D) are free to advertise.

Answer: A
Diff: 1
Section: 12.1

7) A monopolistically competitive firm in short–run equilibrium:
A) will make negative profit (lose money).
B) will make zero profit (break–even).
C) will make positive profit.
D) Any of the above are possible.

Answer: D
Diff: 1
Section: 12.1

8) A monopolistically competitive firm in long–run equilibrium:
A) will make negative profit.
B) will make zero profit.
C) will make positive profit.
D) Any of the above are possible.

Answer: B
Diff: 1
Section: 12.1

9) What happens to an incumbent firm's demand curve in monopolistic competition as new firms enter?
A) It shifts right.
B) It shifts left.
C) It becomes horizontal.
D) New entrants will not affect an incumbent firm's demand curve.

Answer: B
Diff: 1
Section: 12.1

10) Which of the following is true of the output level produced by a firm in long–run equilibrium in a monopolistically competitive industry?
A) It produces at minimum average cost.
B) It does not produce at minimum average cost, and average cost is increasing.
C) It does not produce at minimum average cost, and average cost is decreasing.
D) Either B or C could be true.

Answer: C
Diff: 1
Section: 12.1

11) Which of the following is true in long-run equilibrium for a firm in a monopolistic competitive industry?
A) The demand curve is tangent to marginal cost curve.
B) The demand curve is tangent to average cost curve.
C) The marginal cost curve is tangent to average cost curve.
D) The demand curve is tangent to marginal revenue curve.

Answer: B
Diff: 1
Section: 12.1

12) Which of the following is true for both perfect and monopolistic competition?
A) Firms produce a differentiated product.
B) Firms face a downward sloping demand curve.
C) Firms produce a homogeneous product.
D) There is freedom of entry and exit in the long run.

Answer: D
Diff: 1
Section: 12.1

13) Which of the following is true for both perfectly competitive and monopolistically competitive firms in the long run?
A) P = MC.
B) MC = ATC.
C) P > MR.
D) Profit equals zero.

Answer: D
Diff: 1
Section: 12.1

14) Which of the following is true in long-run equilibrium for a firm in monopolistic competition?
A) MC = ATC.
B) MC > ATC.
C) MC < ATC.
D) Any of the above may be true.

Answer: C
Diff: 2
Section: 12.1

15) Excess capacity in monopolistically competitive industries results because in equilibrium
A) each firm's output level is too great to minimize average cost.
B) each firm's output level is too small to minimize average cost.
C) firms make positive economic profit.
D) price equals marginal cost.

Answer: B
Diff: 2
Section: 12.1

16) Although firms earn zero profits in the long run, why is the outcome from monopolistic competition considered to be inefficient?
A) Price exceeds marginal cost.
B) Quantity is lower than the perfectly competitive outcome.
C) Goods are not identical.
D) A and B are correct.
E) B and C are correct.

Answer: D
Diff: 2
Section: 12.1

17) The authors cited statistical evidence that the price elasticity of demand for Royal Crown cola is –2.4, and the price elasticity of demand for Coke is roughly –5.5. Which firm likely has stronger brand loyalty among customers that provides greater potential for monopoly power in the cola market?
A) Coke
B) Royal Crown
C) Both firms should have identical monopoly power
D) We do not have enough information to answer this question.

Answer: B
Diff: 2
Section: 12.1

18) Why don't some firms in monopolistic competition earn losses in the long run?
A) The firms have enough monopoly power to ensure they always earn profits.
B) Free entry allows enough firms to remain in the market and maintain the critical mass of firms required to attract customers.
C) Free exit implies that any unprofitable firms leave the market in the long run.
D) In the long run, firms will build enough brand loyalty among customers to ensure a profitable level of sales.

Answer: C
Diff: 2
Section: 12.1

19) The market structure in which strategic considerations are most important is
A) monopolistic competition.
B) oligopoly.
C) pure competition.
D) pure monopoly.

Answer: B
Diff: 1
Section: 12.2

20) In the Cournot duopoly model, each firm assumes that
A) rivals will match price cuts but will not match price increases.
B) rivals will match all reasonable price changes.
C) the price of its rival is fixed.
D) the output level of its rival is fixed.

Answer: D
Diff: 1
Section: 12.2

21) A situation in which each firm selects its best action, given what its rivals are doing, is called a
A) Nash equilibrium. B) Cooperative equilibrium.
C) Stackelberg equilibrium. D) zero sum game.

Answer: A
Diff: 1
Section: 12.2

22) Which of the following can be thought of as a barrier to entry?
A) scale economies. B) patents.
C) strategic actions by incumbent firms. D) all of the above

Answer: D
Diff: 1
Section: 12.2

23) In the _____, each firm treats the output of its competitor as fixed and then decides how much to produce.
A) Cournot model
B) model of monopolistic competition
C) Stackelberg model
D) kinked–demand model
E) none of the above

Answer: A
Diff: 1
Section: 12.2

24) A _____ shows how much a firm will produce as a function of how much it thinks its competitors will produce.
A) contract curve
B) demand curve
C) reaction curve
D) Nash equilibrium curve
E) none of the above

Answer: C
Diff: 1
Section: 12.2

25) Which of the following markets is most likely to be oligopolistic?
A) The market for corn B) The market for aluminum
C) The market for colas D) The market for ground coffees

Answer: B
Diff: 1
Section: 12.2

26) The market structure in which there is interdependence among firms is
A) monopolistic competition. B) oligopoly.
C) perfect competition. D) monopoly.

Answer: B
Diff: 1
Section: 12.2

27) In comparing the Cournot equilibrium with the competitive equilibrium,
A) both profit and output level are higher in Cournot.
B) both profit and output level are higher in the competitive equilibrium.
C) profit is higher, and output level is lower in the competitive equilibrium.
D) profit is higher, and output level is lower in Cournot.

Answer: D
Diff: 2
Section: 12.2

Scenario 12.1:
Suppose mountain spring water can be produced at no cost and that the demand and marginal revenue curves for mountain spring water are given as follows:
$Q = 6000 - 5P$ $MR = 1200 - 0.4Q$

28) Refer to Scenario 12.1. What is the profit maximizing price of a monopolist?
A) $400
B) $600
C) $800
D) $900
E) none of the above

Answer: B
Diff: 2
Section: 12.2

29) Refer to Scenario 12.1. What will be the price in the long run if the industry is a Cournot duopoly?
A) $400
B) $600
C) $800
D) $900
E) Competition will drive the price to zero.

Answer: A
Diff: 2
Section: 12.2

30) The Cournot equilibrium can be found by treating _____ as a pair of simultaneous equations and by finding the combination of Q1 and Q2 that satisfy both equations.
A) the reaction curves for firms 1 and 2
B) the market supply curve and the market demand curve
C) the contract curve and the market demand curve
D) the contract curve and the market supply curve
E) the firm's supply curve and the firm's demand curve

Answer: A
Diff: 3
Section: 12.2

31) The oligopoly model that is most appropriate when one large firm usually takes the lead in setting price is the _____ model.
A) Cournot
B) Stackelberg
C) game theory
D) prisoner's dilemma

Answer: B
Diff: 1
Section: 12.3

32) Under a Cournot duopoly, the collusion curve represents:
A) all possible allocations of the pure monopoly quantity among the two firms in the duopoly.
B) all possible allocations of the pure monopoly quantity that would be possible if the two firms in the duopoly did not cooperate.
C) all optimal price–quantity outcomes for a cartel rather than a Cournot duopoly.
D) the potential profits to be earned by firms in a collusive cartel.

Answer: A
Diff: 2
Section: 12.2

33) For a market with a linear demand curve and constant marginal cost of production, why are the reaction functions for the Cournot duopoly sellers also straight lines?
A) The reaction functions do not have to be straight lines, and they are only drawn this way in the book to keep the figures simple.
B) Cournot thought the lines would be straight, but this was proven wrong by other economists.
C) Marginal revenue is always linear when marginal costs are constant.
D) We know that the marginal revenue curves for linear demand curves are also straight lines.

Answer: D
Diff: 2
Section: 12.2

34) In the Stackelberg model, suppose the first–mover has MR = 15 – Q_1, the second firm has reaction function Q2 = 15 – Q_1/2, and production occurs at zero marginal cost. Why doesn't the first–mover announce that its production is $Q_1 = 30$ in order to exclude the second firm from the market (i.e., $Q_2 = 0$ in this case)?
A) In this case, MR is negative and is less than MC, so the first–mover would be producing less than the optimal quantity.
B) In this case, MR is negative and is less than MC, so the first–mover would be producing too much output.
C) This is a possible outcome from the Stackelberg duopoly under these conditions.
D) We do not have enough information to determine if this is an optimal outcome for this case.

Answer: B
Diff: 3
Section: 12.2

35) What is one difference between the Cournot and Stackelberg models?
A) In Cournot, both firms make output decisions simultaneously, and in Stackelberg, one firm sets its output level first.
B) In Stackelberg, both firms make output decisions simultaneously, and in Cournot, one firm sets its output level first.
C) In Cournot, a firm has the opportunity to react to its rival.
D) Profits are zero in Cournot and positive in Stackelberg.

Answer: A
Diff: 1
Section: 12.2

36) Which of the following is true in the Stackelberg model?
A) The first firm produces less than its rival.
B) The first firm produces more than its rival.
C) Both firms produce the same quantity.
D) Both firms have a reaction curve.

Answer: B
Diff: 1
Section: 12.2

37) In the Stackelberg model, there is an advantage
A) to waiting until your competitor has committed herself to a particular output level before deciding on your output level.
B) to being the first competitor to commit to an output level.
C) to the firm with a dominant strategy.
D) to producing an output level which is identical to a monopolist's output level.

Answer: B
Diff: 2
Section: 12.2

38) Which one of the following statements is a common criticism of the original Bertrand duopoly model?
A) Firms never choose optimal prices as strategic variables.
B) Firms would more naturally choose quantities if goods are homogenous.
C) The assumption that market share is split evenly between the firms is unrealistic.
D) A and B are correct.
E) B and C are correct.

Answer: E
Diff: 1
Section: 12.3

39) Is there a first–mover advantage in the Bertrand duopoly model with homogenous products?
A) Yes, first–movers always hold the advantage over other firms.
B) Yes, first–movers may have an advantage, but it depends on the model assumptions.
C) No, first–movers cannot choose a profit maximizing quantity because the second–mover can always produce a bit less and earn higher profits.
D) No, the second–mover would be able to set a slightly lower price and capture the full market share.

Answer: D
Diff: 2
Section: 12.3

40) Collusion can earn higher prices and higher profits under the Bertrand model, but why is this an unlikely outcome in practice?
A) Firms prefer to remain independent of other firms so that their pricing plans can be more flexible over time.
B) The collusive firms have an incentive to gain market share at the expense of the other firms by cutting prices.
C) The federal antitrust authorities have an easier time catching firms that collude on price rather than quantity.
D) none of the above

Answer: B
Diff: 2
Section: 12.3

41) Which oligopoly model(s) have the same results as the competitive model?
A) Cournot
B) Bertrand
C) Stackelberg
D) Both Cournot and Stackelberg

Answer: B
Diff: 1
Section: 12.3

42) In which oligopoly model(s) do firms earn zero profit?
A) Cournot
B) Bertrand
C) Stackelberg
D) Oligopoly firms always earn positive economic profits.

Answer: B
Diff: 1
Section: 12.3

43) In the _____, one firm sets its output first, and then a second firm, after observing the first firm's output, makes its output decision.
A) Cournot model
B) model of monopolistic competition
C) Bertrand model
D) kinked–demand model
E) none of the above

Answer: E
Diff: 2
Section: 12.3

44) In the _____, two duopolists compete by simultaneously selecting price.
A) Cournot model
B) Nash model
C) Bertrand model
D) kinked–demand model
E) none of the above

Answer: C
Diff: 1
Section: 12.3

45) In the Bertrand model with homogeneous products,
A) the firm that sets the lower price will capture all of the market.
B) the Nash equilibrium is the competitive outcome.
C) both firms set price equal to marginal cost.
D) all of the above
E) the outcome is inconclusive.

Answer: D
Diff: 1
Section: 12.3

46) Relative to the Nash equilibrium in the Cournot model, the Nash equilibrium in the Bertrand model with homogeneous products
A) results in the same output but a higher price.
B) results in the same output but a lower price.
C) results in a larger output at a lower price.
D) results in a smaller output at a higher price.
E) any of the above may result.

Answer: C
Diff: 2
Section: 12.3

47) Which statement most nearly describes a Nash equilibrium applied to price competition?
A) Two firms cooperate and set the price that maximizes joint profits.
B) Each firm automatically moves to the purely competitive equilibrium because it knows the other firm will eventually move to that price anyway.
C) Given the prices chosen by its competitors, no firm has an incentive to change their prices from the equilibrium level.
D) One dominant firm sets the price, and the other firms take that price as if it were given by the market.

Answer: C
Diff: 2
Section: 12.3

48) Two firms operating in the same market must choose between a collude price and a cheat price. Firm A's profit is listed before the comma, B's outcome after the comma.

		Firm B	
		Cheat Price	Collude Price
Firm A	Cheat Price	18, 18	30, 6
	Collude Price	6, 30	24, 24

If each firm tries to choose a price that is best for it, regardless of the other firm's price, which of these statements is correct?
A) Firm A should charge the collude price, Firm B should charge a cheat price.
B) Firm A should charge a cheat price, Firm B should charge a collude price.
C) Both firms should charge a collude price.
D) Both firms should charge a cheat price.

Answer: D
Diff: 2
Section: 12.4

49) The Prisoners' Dilemma is a particular type of game in which negotiation and enforcement of binding contracts is not possible, and such games are known as:

A) cooperative games. B) noncooperative games.
C) collusive games. D) Cournot games.

Answer: B
Diff: 1
Section: 12.4

50) Consider the following payoff matrix for a game in which two firms attempt to collude under the Bertrand model:

	Firm B cuts	Firm B colludes
Firm A cuts	6,6	24,0
Firm A colludes	0,24	12,12

Here, the possible options are to retain the collusive price (collude) or to lower the price in attempt to increase the firm's market share (cut). The payoffs are stated in terms of millions of dollars of profits earned per year. What is the Nash equilibrium for this game?

A) Both firms cut prices. B) A cuts and B colludes.
C) B cuts and A colludes. D) Both firms collude.

Answer: A
Diff: 2
Section: 12.4

51) Consider the following payoff matrix for a game in which two firms attempt to collude under the Bertrand model:

	Firm B cuts	Firm B colludes
Firm A cuts	6,6	24,8
Firm A colludes	8,24	12,12

Here, the possible options are to retain the collusive price (collude) or to lower the price in attempt to increase the firm's market share (cut). The payoffs are stated in terms of millions of dollars of profits earned per year. What is the Nash equilibrium for this game?

A) Both firms cut prices.
B) Both firms collude.
C) There are two Nash equilibria: A cuts and B colludes, and A colludes and B cuts.
D) There are no Nash equilibria in this game.

Answer: C
Diff: 3
Section: 12.4

52) The oligopoly model that predicts that oligopoly prices will tend to be very rigid is the _____ model.
A) Cournot
B) Stackelberg
C) dominant firm
D) kinked demand

Answer: D
Diff: 1
Section: 12.5

53) In the kinked demand curve model, if one firm reduces its price
A) other firms will also reduce their price.
B) other firms will compete on a non-price basis.
C) other firms will raise their price.
D) Both A and B are correct.
E) Both B and C are correct.

Answer: A
Diff: 1
Section: 12.5

54) Suppose that three oligopolistic firms are currently charging $12 for their product. The three firms are about the same size. Firm A decides to raise its price to $18, and announces to the press that it is doing so because higher prices are needed to restore economic vitality to the industry. Firms B and C go along with Firm A and raise their prices as well. This is an example of
A) price leadership.
B) collusion.
C) the dominant firm model.
D) the Stackelberg model.
E) none of the above

Answer: A
Diff: 1
Section: 12.5

55) A market structure in which there is one large firm that has a major share of the market and many smaller firms supplying the remainder of the market is called:
A) the Stackelberg Model.
B) the kinked demand curve model.
C) the dominant firm model.
D) the Cournot model.
E) the Bertrand model.

Answer: C
Diff: 1
Section: 12.5

56) In the dominant firm model, the smaller fringe firms behave like:
A) competitive firms.
B) Cournot firms.
C) Stackelberg firms.
D) Bertrand firms.
E) monopolists.

Answer: A
Diff: 1
Section: 12.5

57) Under the kinked demand curve model, an increase in marginal cost will lead to
A) an increase in output level and a decrease in price.
B) a decrease in output level and an increase in price.
C) a decrease in output level and no change in price.
D) neither a change in output level nor a change in price.

Answer: D
Diff: 1
Section: 12.5

58) Which of the following is true about the demand curve facing the dominant firm?
A) It equals market demand minus fringe firms' supply curve.
B) It is identical to market demand.
C) It equals market demand minus demand facing the fringe firms.
D) It is horizontal.

Answer: A
Diff: 1
Section: 12.5

59) The kinked demand curve model is based on the assumption that each firm
A) considers its rival's output to be fixed.
B) considers its rival's price to be fixed.
C) believes rivals will match all price changes.
D) believes rivals will never match price changes.
E) none of the above

Answer: E
Diff: 2
Section: 12.5

60) In the dominant firm model, the fringe firms
A) are price takers.
B) maximize profit by equating average revenue and average cost.
C) determine their price and output before the dominant firm determines its price and output.
D) all of the above
E) none of the above

Answer: A
Diff: 2
Section: 12.5

Scenario 12.2:

You are studying a market for which the kinked demand curve model applies. The kinked demand curve is as follows:

$Q = 1200 - 5P$ for $0 \leq Q < 150$

$Q = 360 - P$ for $150 \leq Q$

The marginal cost is given as:

$MC = Q$

61) Refer to Scenario 12.2. What is the profit maximizing level of output?

A) 171.43
B) 120
C) 150
D) all of the above
E) none of the above

Answer: C
Diff: 3
Section: 12.5

62) Refer to Scenario 12.2. What is the profit maximizing price?

A) 205.72
B) 240
C) 210
D) all of the above
E) none of the above

Answer: C
Diff: 3
Section: 12.5

63) Refer to Scenario 12.2. Suppose that the marginal cost increases such that:

$MC = Q + 10$

What is the profit maximizing level of output?

A) 171.43
B) 120
C) 150
D) all of the above
E) none of the above

Answer: C
Diff: 3
Section: 12.5

64) Refer to Scenario 12.2. Suppose that the marginal cost increases such that:

$MC = Q + 10$

What is the profit maximizing price?

A) 205.72
B) 240
C) 210
D) all of the above
E) none of the above

Answer: C
Diff: 3
Section: 12.5

65) Refer to Scenario 12.2. Suppose that the marginal cost falls such that:

MC = Q – 10

What is the profit maximizing level of output?

A) 171.43
B) 120
C) 150
D) all of the above
E) none of the above

Answer: C
Diff: 3
Section: 12.5

66) Refer to Scenario 12.2. Suppose that the marginal cost falls such that:

MC = Q – 10

What is the profit maximizing price?

A) 205.72
B) 240
C) 210
D) all of the above
E) none of the above

Answer: C
Diff: 3
Section: 12.5

67) The key disadvantage of the kinked–demand model is that it:

A) explains why firms may collude, but it does not explain how they interact.
B) does not explain why prices may be rigid in an oligopoly.
C) requires the assumptions of perfect competition.
D) only holds under price leadership.

Answer: B
Diff: 1
Section: 12.5

68) Use the following statements to answer this question:

I. Under the dominant firm model, the dominant firm effectively acts like a monopolist who is facing the excess market demand that cannot be supplied by the fringe firms.

II. If the fringe supply curve shifts leftward in the dominant firm model, then the resulting market equilibrium price is _____ and the dominant firm's quantity _____.

A) lower, decreases
B) lower, increases
C) higher, decreases
D) higher, increases

Answer: D
Diff: 2
Section: 12.5

69) Under the kinked demand model, suppose the firm's demand curve shifts rightward but the price at which the kink occurs remains the same. In this case, the firm:
A) does not change its output.
B) increases output.
C) decreases output.
D) We do not have enough information to answer this question.

Answer: B
Diff: 3
Section: 12.5

70) Which of the following is NOT conducive to the successful operation of a cartel?
A) Market demand for the good is relatively inelastic.
B) The cartel supplies all of the world's output of the good.
C) Cartel members have substantial cost advantages over non–member producers.
D) The supply of non–cartel members is very price elastic.

Answer: D
Diff: 1
Section: 12.6

71) This market situation is much like a pure monopoly except that its member firms tend to cheat on agreed upon price and output strategies. What is it?
A) Duopoly
B) Cartel
C) Market sharing monopoly
D) Natural monopoly

Answer: B
Diff: 1
Section: 12.6

72) Use the following statements to answer this question:
I. Cartels are illegal in the United States.
II. Once price and production levels are agreed upon, each member of a cartel has an incentive to "cheat" on the agreement.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 1
Section: 12.6

73) If all producers in a market are cartel members, then the demand curve facing the cartel is
A) the market demand curve.
B) horizontal.
C) identical to the demand curve in the dominant firm model.
D) identical to the monopolist's demand curve.

Answer: D
Diff: 2
Section: 12.6

74) The authors explain that the international copper cartel (CIPEC) has been largely ineffective in raising the price of copper in world markets, and the reason is mainly due to the relatively elastic demand for copper. Suppose the cartel recognized that there are multiple uses for copper, and some of the uses have few substitute products (e.g., copper electrical wire) while others have several close substitutes (e.g., copper water pipes). If cartel attempted to raise the price of copper in one of these sub–markets, which market should the cartel choose?
A) Market with several close substitutes because demand is more elastic.
B) Market with several close substitutes because demand is more inelastic.
C) Market with few close substitutes because demand is more elastic.
D) Market with few close substitutes because demand is more inelastic.

Answer: D
Diff: 2
Section: 12.6

75) The authors explain that the international copper cartel (CIPEC) has been largely ineffective in raising the price of copper in world markets, and the reason is mainly due to the relatively elastic demand for copper. Suppose the cartel recognized that there are multiple uses for copper, and some of the uses have few substitute products (e.g., copper electrical wire) while others have several close substitutes (e.g., copper water pipes). To increase profits, the cartel could raise the price of copper in the sub–markets with relatively inelastic demand. What else would the cartel have to do in order to make the cartel's action effective?
A) The cartel would have to seek permission from the U.S. Department of Justice.
B) The cartel would have to get the cooperation of all other copper producers in order to raise the price by some positive amount.
C) The cartel would have to find a way to keep the buyers in the low–price market from reselling the copper to buyers in the high–price market.
D) none of the above

Answer: C
Diff: 2
Section: 12.6

76) Suppose the supply of non–OPEC oil increases due to new petroleum discoveries in other countries. What happens to the price of oil on the world market?
A) Increases
B) Decreases
C) Remains the same
D) We do not have enough information to answer this question.

Answer: B
Diff: 2
Section: 12.6

77) Suppose the supply of non–OPEC oil increases due to new petroleum discoveries in other countries. What happens OPEC's share of the world oil market?
A) Increases
B) Decreases
C) Remains the same
D) We do not have enough information to answer this question.

Answer: B
Diff: 2
Section: 12.6

78) Cartels can more easily detect cheating by cartel members if the products sold by each member are largely homogeneous. As product quality varies, the observed prices charged by cartel members may be due to differences in the products, or they may be due to cheating. Which of the following goods would more difficult to monitor for potential cheating?
A) Aluminum ingots
B) Industrial concrete
C) Steel beams
D) Luxury yachts

Answer: D
Diff: 1
Section: 12.6

Scenario 12.3:
Suppose a stream is discovered whose water has remarkable healing powers. You decide to bottle the liquid and sell it. The market demand curve is linear and is given as follows:

$P = 30 - Q$

The marginal cost to produce this new drink is $3.

79) Refer to Scenario 12.3. What price would this new drink sell for if it sold in a competitive market?
A) 0 B) $3 C) $13.50 D) $16.50 E) $27

Answer: B
Diff: 3
Section: 12.2

80) Refer to Scenario 12.3. What is the monopoly price of this new drink?
A) 0 B) $3 C) $13.50 D) $16.50 E) $27

Answer: D
Diff: 3
Section: 12.2

81) Refer to Scenario 12.3. What will be the price of this new drink in the long run if the industry is a Cournot duopoly?
A) $3
B) $9
C) $12
D) $13.50
E) none of the above

Answer: B
Diff: 3
Section: 12.2

82) Refer to Scenario 12.3. What will be the price of this new drink in the long run if the industry is a Stackelberg duopoly?
A) $3
B) $9
C) $12
D) $13.50
E) none of the above

Answer: E
Diff: 3
Section: 12.2

83) Refer to Scenario 12.3. What will be the price of this new drink in the long run if the industry is a Bertrand duopoly?
A) $3
B) $9
C) $12
D) $13.50
E) none of the above

Answer: A
Diff: 3
Section: 12.3

84) Refer to Scenario 12.3. What will be the price of this new drink in the long run if the firms in the industry collude with one another to maximize joint profit?
A) $3
B) $9
C) $12
D) $16.50
E) none of the above

Answer: D
Diff: 3
Section: 12.3

85) A firm operating in a monopolistically competitive market faces demand and marginal revenue curves as given below:

$P = 10 - 0.1Q \quad MR = 10 - 0.2Q$

The firm's total and marginal cost curves are:

$TC = -10Q + 0.0333Q^3 + 130 \qquad MC = -10 + 0.0999Q^2,$

where P is in dollars per unit, output rate Q is in units per time period, and total cost C is in dollars.

a. Determine the price and output rate that will allow the firm to maximize profit or minimize losses.

b. Compute a Lerner index.

Answer: ***a.***

Calculate MR and equate it to MC.

$MC = MR$

$-10 + 0.10Q^2 = 10 - 0.2Q$

$0.1Q^2 + 0.2Q - 20 = 0$

The quadratic formula yields:

$Q_1 = 13.17 \qquad Q_2 = -15.15.$

Use Q_1 since negative quantities are not meaningful.

At $Q_1 = 13.17$

$P = 10 - 0.1(13.17) = 8.68$

b.

Computation of monopoly power. The Lerner index is computed below:

$$L = \frac{P - MC}{P}$$

At $Q = 13.17$, $P = 8.68$, and $MC = 7.34$

$L = (8.68 - 7.34)/8.68 = 0.154$

Diff: 2
Section: 12.1

86) Suppose that the market demand for mountain spring water is given as follows:

$P = 1200 - Q$

Mountain spring water can be produced at no cost.

a. What is the profit maximizing level of output and price of a monopolist?
b. What level of output would be produced by each firm in a Cournot duopoly in the long run? What will the price be?
c. What will be the level of output and price in the long run if this industry were perfectly competitive?

Answer: ***a.***

The monopoly level of output is found where marginal revenue equals marginal cost. The marginal revenue curve has the same price intercept as the demand curve and twice the slope. Thus:

$MR = 1{,}200 - 2Q$

Setting MR equal to MC (which is zero in this problem) yields:

$1{,}200 - 2Q = 0$

$Q = 600$

$P = 1{,}200 - 600 = 600$

b.

The Cournot equilibrium is found by using the reaction curves of the two firms to solve for levels of output. The reaction curve for firm 1 is found as follows:

$R1 = PQ_1 = (1{,}200 - Q)Q_1$

$= 1{,}200Q_1 - (Q_1 + Q_2)Q_1$

$= 1{,}200Q_1 - Q_1^2 - Q_2Q_1$

The firm's marginal revenue MR1 is just the incremental revenue R1 resulting from an incremental change in output ΔQ_1:

$MR1 = \Delta R1/\Delta Q_1 = 1{,}200 - 2Q_1 - Q_2$

Setting MR1 equal to zero (the firm's marginal cost) and solving for Q_1 yields the reaction curve for Q_1:

Firm 1's Reaction Curve: $Q_1 = 600 - (1/2)Q_2$

Going through the same calculations for firm 2 yields:

Firm 2's Reaction Curve: $Q_2 = 600 - (1/2)Q_1$

Solving the reaction curves simultaneously for Q_1 and Q_2 yields: $Q_1 = Q_2 = 400$. Thus the total output is 800 and the price will be $400.

c.

In the industry were perfectly competitive, price will be equated to marginal cost.

$P = 1{,}200 - Q = 0$ or $Q = 1{,}200$ and $P = 0$

Diff: 3
Section: 12.2

87) Bartels and Jaymes are two individuals who one day discover a stream that flows wine cooler instead of water. Bartels and Jaymes decide to bottle the wine cooler and sell it. The marginal cost of bottling wine cooler and the fixed cost to bottle wine cooler are both zero. The market demand for bottled wine cooler is given as:

$$P = 90 - 0.25Q$$

where Q is the total quantity of bottled wine cooler produced and P is the market price of bottled wine cooler.

a. What is the economically efficient price of bottled wine cooler?
b. What is the economically efficient quantity of bottled wine cooler produced?
c. If Bartels and Jaymes were to collude with one another and produce the profit–maximizing monopoly quantity of bottled wine cooler, how much bottled wine cooler will they produce?
d. Given the output level in (c), what price will Bartels and Jaymes charge for bottled wine cooler?
e. At the output level in (c), what is the welfare loss?
f. Suppose that Bartels and Jaymes act as Cournot duopolists, what are the reaction functions for Bartels and for Jaymes?
g. In the long run, what level of output will Bartels produce if Bartels and Jaymes act as Cournot duopolists?
h. In the long run, what will be the price of wine coolers be if Bartels and Jaymes act as Cournot duopolists?
i. Suppose that after Bartels and Jaymes have arrived at their long run equilibrium as Cournot duopolists, another individual, Paul Mason, discovers the streams. Paul Mason, who will sell no wine cooler before its time, decides to bottle wine coolers. There are now three Cournot firms producing at once. In the long run, what level of output will Bartels produce?

Answer: ***a.***

The economically efficient level of price is found where price equals marginal cost. The marginal cost is zero. Therefore, the efficient price is zero.

b.

At a price of zero, Q = 360.

c.

The profit maximizing level of output is found where MR = MC. The MR curve has the same price intercept as the demand curve and is twice as steep. Thus, a monopolist will produce half as much as the competitive level (this is only true because marginal cost is constant). The competitive level of output is 360. Therefore, the monopoly level of output is 180.

Mathematically, the marginal revenue curve is:

$$MR = 90 - 0.5Q$$

Equating MR to MC yields:

$$90 - 0.5Q = 0$$
$$Q = 180$$

d.

When Q = 180 we have $P = 90 - 0.25(180) = 45$.

e.

The welfare loss is the value of the output that would have been produced under the conditions of economic efficiency, but is not produced due to the monopoly. This is the area of the triangle from Q = 180 to Q = 360, under the demand curve. The base of the triangle is 180, the height of the triangle is 45, and therefore the welfare loss is $(1/2)(180)(45) = 4{,}050$.

f.

The Cournot equilibrium is found by using the reaction curves of the two firms to solve for levels of output. The reaction curve for firm 1 (Bartels) is found as follows:

$$R_1 = PQ_1 = (90 - 0.25Q)Q_1$$
$$= 90Q_1 - 0.25(Q_1 + Q_2)Q_1$$
$$= 90Q_1 - 0.25Q_1^2 - 0.25Q_2Q_1$$

The firm's marginal revenue MR_1 is just the incremental revenue dR_1 resulting from an incremental change in output dQ_1:

$$MR_1 = dR_1/dQ_1 = 90 - 0.5Q_1 - 0.25Q_2$$

Setting MR_1 equal to zero (the firm's marginal cost) and solving for Q_1 yields the reaction curve for Q_1:

Firm 1's Reaction Curve: $Q_1 = 180 - (1/2)Q_2$

Going through the same calculations for firm 2 yields:

Firm 2's Reaction Curve: $Q_2 = 180 - (1/2)Q_1$

g.

Solving the reaction curves simultaneously for Q_1 and Q_2 yields:

$$Q_1 = Q_2 = 120.$$

h.

The total output is 240 (120 by each firm). Therefore:

$$P = 90 - 0.25(240) = 30.$$

i.

The Cournot equilibrium for three firms is found by solving the reaction curves of the three firms simultaneously for levels of output. The reaction curve for firm 1 (Bartels) is found as follows:

$$R_1 = PQ_1 = (90 - 0.25Q)Q_1$$
$$= 90Q_1 - 0.25(Q_1 + Q_2 + Q_3)Q_1$$
$$= 90Q_1 - 0.25Q_1^2 - 0.25Q_2Q_1 - 0.25Q_3Q_1$$

The firm's marginal revenue MR_1 is just the incremental revenue dR_1 resulting from an incremental change in output dQ_1:

$$MR_1 = dR_1/dQ_1 = 90 - 0.5Q_1 - 0.25Q_2 - 0.25Q_3$$

Setting MR_1 equal to zero (the firm's marginal cost) and solving for Q_1 yields the reaction curve for Q_1:

Firm 1's Reaction Curve: $Q_1 = 180 - 0.5Q_2 - 0.5Q_3$

Going through the same calculations for firm 2 yields:

Firm 2's Reaction Curve: $Q_2 = 180 - 0.5Q_1 - 0.5Q_3$

Going through the same calculations for firm 3 yields:

Firm 3's Reaction Curve: $Q_3 = 180 - 0.5Q_2 - 0.5Q_3$

Solving the reaction curves simultaneously for Q_1, Q_2 and Q_3 yields:

$$Q_1 = Q_2 = Q_3 = 90.$$

Diff: 3
Section: 12.2

88) Two large diversified consumer products firms are about to enter the market for a new pain reliever. The two firms are very similar in terms of their costs, strategic approach, and market outlook. Moreover, the firms have very similar individual demand curves so that each firm expects to sell one–half of the total market output at any given price. The market demand curve for the pain reliever is given as:

$Q = 2600 - 400P.$

Both firms have constant long–run average costs of $2.00 per bottle. Patent protection insures that the two firms will operate as a duopoly for the foreseeable future. Price and quantity values are stated in per–bottle terms. If the firms act as Cournot duopolists, solve for the firm and market outputs and equilibrium prices.

Answer: Begin by solving for P.

$Q = 2600 - 400P$

$Q - 2600 = -400P$

$P = 6.5 - 0.0025Q$

Denote the two firms A and B and solve for reaction functions.

$TR_A = P_A \cdot Q_A$

$TR_A = (6.5 - 0.0025Q)Q_A$

$TR_A = 6.5Q_A - 0.0025[(Q_A + Q_B)Q_A]$

$TR_A = 6.5Q_A - 0.0025Q_A^2 - 0.0025Q_AQ_B$

$MR_A = 6.5 - 0.005Q_A - 0.0025Q_B$

Set $MR_A = MC$

$6.5 - 0.005Q_A - 0.0025Q_B = 2$

$-0.005Q_A = 4.5 + 0.0025Q_B$

$Q_A = 900 - 0.5Q_B$

One can verify that:

$Q_B = 900 - 0.5Q_A$

Substitute expression for Q_B into Q_A

$Q_A = 900 - 0.5(900 - 0.5Q_A)$

$Q_A = 900 - 450 + 0.25Q_A$

$Q_A - 0.25Q_A = 450$

$Q_A(1 - 0.25) = 450$

$$Q_A = \frac{450}{0.75} = 600$$

Substitute expression for Q_A into Q_B

$Q_B = 900 - 0.5(900 - 0.5Q_B)$

$Q_B = 900 - 450 + 0.25Q_B$

$Q_B - 0.25Q_B = 450$

$Q_B(1 - 0.25) = 450$

$$Q_B = \frac{450}{0.75} = 600$$

$Q_T = Q_A + Q_B$

$Q_T = 600 + 600 = 1200$

$P = 6.5 - 0.0025(1200)$

$P = \$3.5$ per bottle

Diff: 3
Section: 12.2

89) Lambert–Rogers Company is a manufacturer of petrochemical products. The firm's research efforts have resulted in the development of a new auto fuel injector cleaner that is considerably more effective than other products on the market. Another firm, G.H. Squires Company, independently developed a very similar product that is as effective as the Lambert–Rogers formula. To avoid a lengthy court battle over conflicting patent claims, the two firms have decided to cross–license each other's patents and proceed with production. It is unlikely that other petrochemical companies will be able to duplicate the product, making the market a duopoly for the foreseeable future. Lambert–Rogers estimates the demand curve given below for the new cleaner. Marginal cost is estimated to be a constant $2 per bottle.

$Q = 300{,}000 - 25{,}000P.$

where P = dollars per bottle and Q = monthly sales in bottles.

a. Lambert–Rogers and G.H. Squires have very similar operating strategies. Consequently, the management of Lambert–Rogers believes that the Cournot model is appropriate for analyzing the market, provided that both firms enter at the same time. Calculate Lambert–Rogers' profit–maximizing output and price according to this model.
b. Lambert–Rogers' productive capacity and technical expertise could allow them to enter the market several months before Squires. Choose an appropriate model and analyze the impact of Lambert Rogers being first into the market. Should Lambert–Rogers hurry to enter first?

Answer: Denote Lambert–Rogers price and quantity as P_L, Q_L and Squires as P_S, Q_S.

Demand function is given as:

$Q = 300{,}000 - 25{,}000P$

Solve for P:

$Q - 300{,}000 = -25{,}000P$

$P = 12 - 0.00004Q$

Outcome under Cournot model:

a.

$TR_L = P_L \cdot Q_L$

$TR_L = (12 - 0.00004Q)Q_L$

$Q = Q_L + Q_S$

$TR_L = [12 - 0.00004(Q_L + Q_S)]Q_L$

$TR_L = 12Q_L - 0.00004Q_L^2 - 0.00004Q_LQ_S$

$MR_L = 12 - 0.00008Q_L - 0.00004Q_S$

Set $MR_L = MC$

$12 - 0.00008Q_L - 0.00004Q_S = 2$

$-0.00008Q_L - 0.00004Q_S = -10$

$Q_L = 125{,}000 - 0.5Q_S$

So, $Q_S = 125{,}000 - 0.5Q_L$

Substitute for Q_S:

$Q_L = 62{,}500 + 0.25Q_L$

$$Q_L = \frac{62{,}500}{0.75} = 83{,}333$$

$Q = Q_L + Q_S$

$Q = 83{,}333 + 83{,}333 = 166{,}666$

$P = 12 - .00004(166{,}666)$

$P = 12 - 6.67 = \$5.33$

$P = \$5.33$ per bottle

166,666 bottles sold per month

b.

The Stackelberg model is appropriate when one firm enters first.

Lambert–Rogers determines its output, which Squires then takes as given.

Lambert's total revenue function is given as:

$$TR_L = 12Q_L - 0.00004Q_L2 - 0.00004Q_LQ_S$$

Squires reaction function $Q_S = 125{,}000 - 0.5Q_L$ can be substituted into TR_L, since Squires will take Lambert's output as given.

$$TR_L = 12Q_L - 0.00004Q_L^2 - 0.00004Q_L(125{,}000 - .5Q_L)$$

$$TR_L = 12Q_L - 0.00004Q_L^2 - 5Q_L + 0.00002Q_L^2$$

$$TR_L = 7Q_L - 0.00002Q_L^2$$

$$MR_L = 7 - 0.00004Q_L$$

Set $MR_L = MC$

$$7 - 0.00004Q_L = 2$$

$$-0.00004Q_L = -5$$

$$Q_L = 125{,}000$$

To find Q_S substitute Q_L into S reaction function

$$Q_S = 125{,}000 - 0.5Q_L$$

$$Q_S = 125{,}000 - 0.5(125{,}000)$$

$$Q_S = 62{,}500$$

$$Q = Q_L + Q_S$$

$$Q = 125{,}000 + 62{,}500$$

$$Q = 187{,}500$$

$$P = 12 - 0.0004(187{,}500)$$

$$P = 12 - 7.5 = \$4.50$$

Lambert–Rogers gets a much larger share of the market by entering first. It should advance its schedule in order to enter first.

$$L = \frac{8.68 - 7.34}{8.68} = 0.15$$

Diff: 3
Section: 12.2

90) The two leading U.S. manufacturers of high performance radial tires must set their advertising strategies for the coming year. Each firm has two strategies available: maintain current advertising or increase advertising by 15%. The strategies available to the two firms, G and B, are presented in the payoff matrix below.

		Firm B	
		Increase Adv.	Maintain Adv.
Firm G	Increase Adv.	27, 27	50, 12
	Maintain Adv.	12, 50	45, 45

The entries in the individual cells are profits measured in millions of dollars. Firm G's outcome is listed before the comma, and Firm B's outcome is listed after the comma.

a. Which oligopoly model is best suited for analyzing this decision? Why? (Remember it is illegal to collude in the United States.)
b. Carefully explain the strategy that should be used by each firm. Support your choice by including numbers.

Answer: ***a.***

The prisoner's dilemma model is most appropriate for analyzing this situation. We can conclude that the prisoner's dilemma is most appropriate because each firm must set its advertising strategy without knowledge of the rival's strategy.

b.

Increasing the advertising level is the dominant strategy, since the firm is better off increasing regardless of the rival's action. For example, if Firm B increases, Firm G earns 27 if it increases and 12 if it does not increase. G is better off increasing. If Firm B doesn't increase, Firm G earns 45 by not increasing and 50 by increasing. Again, Firm G is better off to increase. It is obvious that no matter what B does, G is better off to increase. Firm B faces the same situation.

Diff: 2
Section: 12.4

91) The market for an industrial chemical has a single dominant firm and a competitive fringe comprised of many firms that behave as price takers. The dominant firm has recently begun behaving as a price leader, setting price while the competitive fringe follows. The market demand curve and competitive fringe supply curve are given below. Marginal cost for the dominant firm is $0.75 per gallon.

$Q_M = 140{,}000 - 32{,}000P$

$Q_F = 60{,}000 + 8{,}000P,$

where Q_M = market quantity demanded, and Q_F = the supply of the competitive fringe. Quantities are measured in gallons per week, and price is measured as a price per gallon.

a. Determine the price and output that would prevail in the market under the conditions described above. Identify output for the dominant firm as well as the competitive fringe.
b. Assume that the market demand curve shifts rightward by 40,000 units. Show that the dominant firm is indeed a price leader. What output (leader and follower) and market price will prevail after the change in demand?

Answer: ***a.***

$Q_M = 140{,}000 - 32{,}000P$

$Q_F = 60{,}000 + 8{,}000P$

Denote dominant firm demand curve as Q_D.

$Q_D = Q_M - Q_F$

$Q_D = 140{,}000 - 32{,}000P - (60{,}000 + 8{,}000P)$

$Q_D = 80{,}000 - 40{,}000P$

Solve for P

$Q_D - 80{,}000 = -40{,}000P$

$P = 2 - 0.000025Q_D$

$MR_D = 2 - 0.00005Q_D$

Marginal cost for the dominant firm is $0.75. Equate MR_D to MC_D

$2 - 0.00005Q_D = 0.75$

$-0.00005Q_D = -1.25$

$Q_D = 25{,}000$

$P = 2 - 0.000025(25{,}000)$

$P = 2 - 0.625 = 1.375$ per gallon

Fringe takes dominant firm price as given

$Q_F = 60{,}000 + 8{,}000(1.375)$

$Q_F = 71{,}000$

$Q_T = 25{,}000 + 71{,}000 = 96{,}000$

b.

A 40,000 increase in demand curve to:

$Q_M = 180{,}000 - 32{,}000P$

$Q_F = 60{,}000 + 8{,}000P$

$Q_D = 180{,}000 - 72{,}000P - (60{,}000 + 8000P)$

$Q_D = 120{,}000 - 40{,}000P$

Solve for P

$Q_D - 120{,}000 = -40{,}000P$

$P_D = 3 - 0.000025Q_D$

$MR_D = 3 - 0.00005Q_D$

setting $MR_D = MC_D$

$3 - 0.00005Q_D = 0.75$

$-0.00005Q_D = -2.25$

$Q_D = 45{,}000$

$P_D = 3 - 0.000025(45{,}000)$

$P_D = 3 - 1.125 = \$1.875$

Fringe again follows

$Q_F = 60{,}000 + 8{,}000(1.875)$

$Q_F = 75{,}000$

$Q_T = 45{,}000 + 75{,}000 = 120{,}000$

We can see that when demand changed, the dominant firm raised price. The competitive fringe took the new price as given and adjusted output accordingly.

Diff: 3
Section: 12.5

92) In the town of Battle Springs, the market for fast food is dominated by Mr. Berger. The other companies tend to follow Mr. Berger's lead in setting price and style of burger. The total demand for cheeseburgers in Battle Springs is:

$P = \$1.50 - \$0.00015Q.$

The marginal cost of producing and serving burgers at Mr. Berger is:

$MC_L = 0.25 + 0.0000417Q.$

The competitive supply curve of burgers by all the other (competitor) firms is:

$P_f = 0.50 + 0.000285Q_f.$

Compute the price that will be set in the market when Mr. Berger behaves as a dominant firm and maximizes profit for itself. Also, compute the production rate by Mr. Berger and the competitor firms.

Answer: The price will be determined along Mr. Berger's demand curve, where $MC_L = MR_L$. First, we find D_L, which is the difference in quantity that will be forthcoming from the followers (QS) and the dominant firm Q_L at various prices below the intersection of S_f and D. This difference at various prices represents the locus of points tracing of D_L.

Total demand:

$P = 1.50 - 0.00015Q$, which can be expressed as

$Q = 10{,}000 - 6{,}666.67P$

Competitor supply:

$P = S_f = 0.50 + 0.000285Q_f$, which can be expressed as

$Q_f = -1{,}754.40 + 3{,}508.77P.$ $(S_f = P)$

Take the difference and the result is the dominant firm's demand curve:

$Q_L = 10{,}000 - 6{,}666.67P + 1{,}754.40 - 3{,}508.77P$

$Q_L = 11{,}754.40 - 10{,}175.44P$ or

$P = 1.155 - 0.0000983Q$

Now find MR for the dominant firm, Mr. Berger.

$R_L = P \cdot Q_L = 1.155Q_L - 0.0000983Q_L^2$

$MR_L = 1.155 - 0.000197Q_L$

Equate MR_L to MC_L to find Mr. Berger's production rate.

$1.155 - 0.000197Q_L = 0.25 + 0.0000417Q_L$

$0.905 = 0.0002387Q_L$

$Q_L = 3{,}791$

At this production rate, the dominant firm would set the price at

$P_L = 1.155 - 0.0000983(3{,}791)$

$P_L = 0.78$ per unit.

Under these conditions, the competitor firms will produce along their collective supply curve at P = 0.78.

$Q_f = -1{,}754.40 + 3{,}508.79(0.78) = 982.46$

Diff: 3
Section: 12.5

93) Consider two identical firms (no. 1 and no. 2) that face a linear market demand curve. Each firm has a marginal cost of zero and the two firms together face demand:

$P = 50 - 0.5Q$, where $Q = Q_1 + Q_2$.

a. Find the Cournot equilibrium Q and P for each firm.

b. Find the equilibrium Q and P for each firm assuming that the firms collude and share the profit equally.

c. Contrast the efficiencies of the markets in (a) and (b) above.

Answer: ***a.***

Determine the reaction curve for no. 1. Equate MR_1 to MC_1.

$R_1 = P_1Q_1 = (50 - 0.5Q)Q_1 = 50Q_1 - 0.5QQ_1$

$= 50Q_1 - 0.5(Q_1 + Q_2)Q_1 = 50Q_1 - 0.5Q_1^2 - 0.5Q_1Q_2$

$MR_1 = 50 - 1Q_1 - 0.5Q_2$.

Since $MC_1 = 0$, then

$50 - 1Q_1 - 0.5Q_2 = 0$

$Q_1 = 50 - 0.5Q_2$

The reaction curve for firm no. 2 is calculated in the same way as that for firm no. 1.

$Q_2 = 50 - 0.5Q_1$

At the intersection of two reaction curves, we find the equilibrium Q_1 and Q_2. By substitution:

$Q_2 = 50 - 0.5(50 - 0.5Q_2)$

$Q_2 = 50 - 25 + 0.25Q_2$

$0.75Q_2 = 25$

$Q_2 = 33.33$

Now solve for Q_1:

$Q_1 = 50 - 0.5Q_2 = 50 - 0.5(33.33) = 33.33$

The total quantity produced $Q = Q_1 + Q_2 = 66.67$

The market equilibrium price is: $P = 50 - 5Q = 50 - 0.5(66.67) = \$16.67$/unit.

Each firm is maximizing its own profit, given its competitor's production rate.

b.

The total revenue for the two firms is:

$R = PQ - (50 - 0.5Q)Q = 50Q - 0.5Q_2$, and thus

$MR = 50 - Q$

Set MR equal to MC = 0 to find Q that maximizes profit.

$50 - Q = 0$

$Q = 50$

If profit is shared equally, then $Q_1 = Q_2 = 25$.

The collusive price is $P = 50 - 0.5(50) = 25$.

c.

When competing, each firm produces 33.33 at a price of 16.67; and when colluding, each produces 25 at a price of 25. The market is more efficient when the firms compete, because in this situation selling price is more nearly equal to marginal cost.

Diff: 3
Section: 12.2

94) The market structure of the local pizza industry is best characterized by monopolistic competition. One Guy's Pizza is one of the producers in the local market. The demand for One Guy's Pizza is:

$Q^d = 225 - 10P \Leftrightarrow P = 22.5 - 0.1Q^d$.

The resulting marginal revenue curve is

$MR(Q^d) = 22.5 - 0.2Q^d$.

One Guy's cost function is:

$C(Q) = 0.15Q^2 \Rightarrow MC(Q) = 0.3Q$.

Determine One Guy's profit maximizing level of output and the price charged to customers. Is this a long–run equilibrium?

Answer: To determine One Guy's optimal output, we set One Guy's marginal revenue equal to marginal cost. This is $22.5 - 0.2Q = 0.3Q \Leftrightarrow Q = 45$. The market price for One Guy's Pizza at this level of output is \$18. This is not a long–run equilibrium because One Guy's is earning a positive profit. The positive profit will attract entrants into the local pizza industry.

Diff: 1
Section: 12.1

95) The market structure of the local boat industry is best characterized by monopolistic competition. Homer's Boat Manufacturing is one of the producers in the local market. The demand for Homer's Boats is:

$Q^d = 5000 - P \Leftrightarrow P = 5000 - Q^d$.

The resulting marginal revenue curve is

$MR(Q^d) = 5000 - 2Q^d$.

Homer's cost function is:

$C(Q) = 3Q^2 \Rightarrow MC(Q) = 6Q$.

Determine Homer's profit maximizing level of output and the price charged to customers. Is this a long–run equilibrium?

Answer: To determine Homer's optimal output, we set Homer's marginal revenue equal to marginal cost. Thus, $5{,}000 - 2Q = 6Q \Leftrightarrow Q = 625$. The market price for Homer at this level of output is \$4,375. This is not a long–run equilibrium because Homer is earning a positive profit. The positive profit will attract entrants into the local boat industry.

Diff: 1
Section: 12.1

96) The market structure of home video gaming systems is best characterized by monopolistic competition. Quasar Entertainment is one of the producers in this market. The inverse demand for Quasar systems is:

$$P = 500 - 9.75Q^d$$

The resulting marginal revenue curve is

$$MR(Q^d) = 500 - 19.5Q^d.$$

Quasar's cost function is:

$$C(Q) = 0.25Q^2 + 6{,}250 \Rightarrow MC(Q) = 0.5Q.$$

Determine Quasar's profit maximizing level of output and the price charged to customers. Is this a long–run equilibrium?

Answer: To determine Quasar's optimal output, we set Quasar's marginal revenue equal to marginal cost. This is $500 - 19.5Q = 0.5Q \Leftrightarrow Q = 25$. The market price for Quasar at this level of output is $256.25. This is a long–run equilibrium because Quasar is earning zero profit. Thus, no firms have an incentive to exit or enter the industry.

Diff: 1
Section: 12.1

97) The market structure of Red Raider Gear is best characterized by monopolistic competition. Red Raider Gear is one of the producers in this market. The demand for Red Raider Gear is: $Q^d = 50 - P \Leftrightarrow P = 50 - Q^d$. The resulting marginal revenue curve is $MR(Q^d) = 50 - 2Q^d$. The Red Raider Gear cost function is $C(Q) = (1/8)Q^2 + 555.56$. Therefore we have $MC(Q) = 0.25Q$. Determine the profit maximizing level of output and the price charged to customers for Red Raider Gear. Is this a long–run equilibrium?

Answer: To determine Red Raider's optimal output, we set Red Raider's marginal revenue equal to marginal cost. Then we have $50 - 2Q = 0.25Q$, and therefore $Q = 22.22$. The market price for Red Raider Gear at this level of output is $27.78. This is a long–run equilibrium because Red Raider Gear is earning zero profit. Thus, no firms have an incentive to exit or enter the industry.

Diff: 1
Section: 12.1

98) Hale's One Stop Gas and Auto Service competes with Murray's Gas and Service Mart. The local demand is given by: $P = 2.50 - 0.01Q$. Hale's marginal cost function is: $MC_H(q_H) = 0.35q_H$. Murray's marginal cost function is: $MC_M(q_M) = 0.30q_M$. Given the demand relationship above, Hale's marginal revenue function is: $MR_H(q_H, q_M) = 2.50 - 0.02q_H - 0.01q_M$. Determine Hale's reaction function. Murray's marginal revenue function is: $MR_M(q_M, q_H) = 2.50 - 0.02q_M - 0.01q_H$. Determine Murray's reaction function. What is the Cournot solution?

Answer: To determine Hale's reaction function, we set Hale's marginal revenue equal to marginal cost and solve for Hale's output as a function of Murray's output.

$2.5 - 0.02q_H - 0.01q_M = 0.35q_H \Leftrightarrow q_H = \frac{2.5 - 0.01q_M}{0.37}$. Murray's reaction function is determined in the same manner.

$2.5 - 0.02q_M - 0.01q_H = 0.3q_M \Leftrightarrow q_M = \frac{2.5 - 0.01q_H}{0.32}$. To determine the Cournot solution, we may insert Hale's reaction function in for Hale's output level in Murray's reaction function. This gives us: $q_M = \frac{2.5 - 0.01\left[\frac{2.5 - 0.01q_M}{0.37}\right]}{0.32} \Leftrightarrow q_M = 7.61$. We may plug this level of output for Murray into Hale's reaction function to learn Hale's optimal output. This is $q_H = 6.55$.

Diff: 2
Section: 12.2

99) The Grand River Brick Corporation uses Business–to–Business internet technology to set output before Bernard's Bricks. This gives the Grand River Brick Corporation "first–move" ability. The market demand for bricks is: $Q^d = 1{,}000 - 100P \Leftrightarrow P = 10 - 0.01Q^d$. Bernard Brick's marginal revenue curve is: $MR_B(q_B, q_G) = 10 - 0.02q_B - 0.01\ q_G$. The marginal cost of producing an additional unit of bricks is constant at $2.00 for each firm. Determine Bernard's reaction function. Given that the Grand River Brick Corporation has this information and moves first, Grand River's marginal revenue curve is: $MR_G(q_G) = 6 - 0.01q_G$. Calculate Grand River Brick Corporations optimal output level. Does the "first–move" ability of the Grand River Brick Corporation allow them to capture a larger market share (note that the marginal revenue curves would be symmetric if Grand River did not have first–move ability)?

Answer: Bernard's reaction function is solved for by equating marginal revenue to marginal cost and solving for Bernard's output as a function of Grand River output.

$10 - 0.02q_B - 0.01\ q_G = 2 \Leftrightarrow q_H\ = 400 - \frac{1}{2}q_G$. Given symmetry if Grand River did not have first–move ability, Grand River's reaction function would be: $q_G = 400 - \frac{1}{2}q_B$. This implies each firm would produce 266.66 units of bricks if there is no first–move ability. With first move ability, Grand River maximizes profits by setting marginal revenue equal to marginal cost. With first–move ability, this is:
$MR_G(q_G) = 6 - 0.01q_G = MC = 2 \Leftrightarrow q_G = 400$. Thus, we see that Grand River captures a larger market share given first–move ability.

Diff: 2
Section: 12.2

100) Quasar Corporation is set to release its latest video game system which utilizes the newest game technology. In fact, the release date is sooner than that of its only rival Orion. This gives Quasar Corporation "first–move" ability. The demand for video game systems is: $Q^d = 150 - 0.1P \Leftrightarrow P = 1{,}500 - 10Q^d$. Orion's marginal revenue curve is: $MR_O(q_O, q_Q) = 1{,}500 - 20q_O - 10q_Q$. The marginal cost functions are: $\begin{matrix} MC_Q(q_Q) = 0.5q_Q \\ MC_O(q_O) = 0.5q_O \end{matrix}$.

Determine Orion's reaction function. Given that Quasar Corporation has this information and moves first, Quasar's marginal revenue function is: $MR_Q(q_Q) = \frac{31{,}500}{41} - \left(\frac{420}{41}\right)q_Q$. Calculate Quasar Corporation's optimal output level. Does the "first–move" ability of Quasar Corporation allow it to capture a larger market share?

Answer: Orion's reaction function is found by equating marginal revenue to marginal cost and solving for Orion's output as a function of Quasar output.

$1{,}500 - 20q_O - 10q_Q = 0.5q_O \Leftrightarrow q_O = \frac{3{,}000 - 20q_Q}{41}$. Given symmetry if Quasar did not have first–move ability, Quasar's reaction function would be: $q_Q = \frac{3{,}000 - 20q_O}{41}$. This implies each firm would produce 49.18 units if there is no first–move ability. With first move ability, Quasar maximizes profits by setting marginal revenue equal to marginal cost. With first–move ability, this is:

$MR_Q(q_Q) = \frac{31{,}500}{41} - \left(\frac{420}{41}\right)q_Q = MC = 0.5q_Q \Leftrightarrow q_Q = 71.51$. Thus, we see that Quasar captures a larger market share given first–move ability.

Diff: 3
Section: 12.2

101) Hale's One Stop and Auto Service competes with Murray's Gas Mart. The local demand is: $Q^d = 25 - 10P \Leftrightarrow P = 2.50 - 0.1Q^d$. Both firms sell exactly the same quality of gasoline. Thus, if the firms charge a different price, the lower price firm will capture the entire market share. If the firms charge the same price, they will split the market share. The marginal cost functions are both constant at \$1.25. If the firms compete by setting price, what is the market output level? What is the market price level?

Answer: If the firms compete by setting price, the equilibrium price will be \$1.25 per unit. The market output level will be 12.5 units. If both firms attempt to price above \$1.25, the firm with the lower price will enjoy the entire market share and earn an economic profit while the higher pricing firm sells no units of output. The higher price firm will have an incentive to undercut the price of the other firm. This behavior will continue until both firms charge \$1.25. If the firms offer a price below \$1.25, they will lose money and exit the industry or raise prices. Thus, equilibrium occurs where both firms charge \$1.25 per unit.

Diff: 2
Section: 12.3

102) On the planet Economus, the demand for Kryptonite is:

$Q^D = 24.08 - 0.06P \Leftrightarrow P = 401\frac{1}{3} - 16\frac{2}{3}Q^D$. There are four producers of Kryptonite on the planet who have formed a Kryptonite Cartel. The resulting marginal revenue function for the cartel is:

$MR(Q) = 401\frac{1}{3} - 33\frac{1}{3}Q$. The marginal costs for producing Kryptonite for the 4 different producers are:

$$MC_1(q_1) = q_1,$$
$$MC_2(q_2) = 1.5q_2,$$
$$MC_3(q_3) = 2q_3,$$
$$MC_4(q_4) = 2.5q_4.$$

Determine the Cartel profit maximization output levels of each producer. If producer #2 cheats and produces 50% more than their collusive output level, determine their new revenue level.

Answer: Note that $Q = q_1 + q_2 + q_3 + q_4$. To maximize Cartel profits, marginal costs will be equated across producers. These two facts imply: $MC_C = \frac{30}{77}Q$. The profit maximizing Cartel output level sets marginal revenue equal to marginal cost. This is: $401\frac{1}{3} - 33\frac{1}{3}Q = \frac{30}{77}Q \Leftrightarrow Q = 11.9$. Marginal costs are 4.636. This implies the Cartel profit maximization production levels for each producer are:

$$\begin{cases} q_1 = 4.636 \\ q_2 = 3.091 \\ q_3 = 2.318 \\ q_4 = 1.854 \end{cases}$$

The market price for Kryptonite at these production levels is \$203 per unit. If producer #2 produces 4.637 units instead, the market price for Kryptonite falls to \$177.233. Total revenue for the second producer rises from \$627.47 to \$821.83. That is, producer #2 raises its own total revenue by 31% if it cheats.

Diff: 2
Section: 12.6

103) The demand for on–line brokerage services is: $Q^D = 6{,}500 - 100P \Leftrightarrow P = 65 - 0.01Q^D$. If the on–line brokerage firms collude, the collusive marginal revenue function is: $MR(Q) = 65 - 0.02Q$. The brokerage firm specific marginal cost functions are:

$$\begin{cases} MC_1(q_1) = 1.5q_1 \\ MC_2(q_2) = 2.0q_2 \\ MC_3(q_3) = 2.5q_3 \\ MC_4(q_4) = 3.0q_4 \end{cases}$$

Calculate the collusive output level and market price. If the brokerage firms behaved competitively and each firm set its own marginal cost equal to price, what would be the output level and market price?

Answer: $\begin{cases} MC_1(q_1) = 1.5q_1 \\ MC_2(q_2) = 2.0q_2 \\ MC_3(q_3) = 2.5q_3 \\ MC_4(q_4) = 3.0q_4 \end{cases} \Leftrightarrow \begin{cases} q_1 = \frac{2}{3}MC \\ q_2 = \frac{1}{2}MC \\ q_3 = \frac{2}{5}MC \\ q_4 = \frac{1}{3}MC \end{cases}$ This implies the collusive supply sets

$Q^S = MC\left(\frac{2}{3} + \frac{1}{2} + \frac{2}{5} + \frac{1}{3}\right) = \frac{19}{10}MC$. The collusive marginal cost function is: $MC = \frac{10}{19}Q$. The collusive profit maximization level sets marginal cost equal to marginal revenue. This is:

$65 - 0.02Q = \frac{10}{19}Q \Leftrightarrow Q = 118.979$. The resulting price is \$63.81. If brokerage firms behave competitively, each firm sets marginal cost equal to price. Thus,

$\begin{cases} MC_1(q_1) = 1.5q_1 \\ MC_2(q_2) = 2.0q_2 \\ MC_3(q_3) = 2.5q_3 \\ MC_4(q_4) = 3.0q_4 \end{cases} \Leftrightarrow \begin{cases} q_1 = \frac{2}{3}P \\ q_2 = \frac{1}{2}P \\ q_3 = \frac{2}{5}P \\ q_4 = \frac{1}{3}P \end{cases}$ This implies competitive supply is

$Q^S = P\left(\frac{2}{3} + \frac{1}{2} + \frac{2}{5} + \frac{1}{3}\right) = \frac{19}{10}P$. Setting supply equal to demand and solving for market price gives us the competitive solution. This is: $\frac{19}{10}P = 6500 - 0.01P \Leftrightarrow P = 63.78$. The competitive market output level is 121.182.

Diff: 3
Section: 12.6

Chapter 13 Game Theory and Competitive Strategy

1) Which of the following conditions, if present, is sufficient to make a game cooperative?
   A) Individual payoffs are greater if all players choose the same strategy.
   B) Players can communicate with each other.
   C) Players can negotiate binding contracts committing them to particular strategies.
   D) Players must agree unanimously on any set of strategies.
   E) The payoff that is highest for all individuals together is also highest for each individual player.

Answer: C
Diff: 1
Section: 13.1

2) You are playing a game in which a dollar bill is auctioned. The highest bidder receives the dollar in return for the amount bid. However, the second–highest bidder must pay the amount that he or she bids, and gets nothing in return. The optimal strategy is:
   A) to bid the smallest allowable increment below $1.
   B) to bid nothing.
   C) to bid $0.99.
   D) to bid more than a dollar.

Answer: B
Diff: 2
Section: 13.1

3) Which of the following are examples of cooperative games?
   A) The bargaining between a buyer and seller over the price of a car
   B) Independent action by two firms in a market regarding advertising strategies
   C) Independent pricing strategies by two firms in a market
   D) Independent pricing strategies by many firms in a market
   E) Team games (such as baseball or basketball)

Answer: A
Diff: 1
Section: 13.1

4) In the spring of 1994, Northwest Airlines took the independent action of reducing fares on its flights. Other competing airlines quickly matched the fare cuts. These actions might be interpreted as:
   A) a noncooperative game.
   B) a cooperative game.
   C) a constant sum game.
   D) a competitive game.

Answer: A
Diff: 1
Section: 13.1

Scenario 13.1:
You are negotiating with your florist over the price of flowers for your wedding. You value the floral arrangements at $500. The florist's cost for the arrangement is $200. You finally settled on a price of $250.

5) Refer to Scenario 13.1. Your negotiations are an example of:
A) a noncooperative game.
B) a cooperative game.
C) a constant sum game.
D) a competitive game.
E) both B and C

Answer: E
Diff: 2
Section: 13.1

6) Refer to Scenario 13.1. At your negotiated price your consumer surplus is:
A) $50. B) $200. C) $250. D) $300.

Answer: C
Diff: 2
Section: 13.1

7) Refer to Scenario 13.1. At your negotiated price the producer surplus is:
A) $0. B) $50. C) $200. D) $250. E) $300.

Answer: B
Diff: 2
Section: 13.1

8) Refer to Scenario 13.1. If your negotiated price had been $350 instead of $250, the sum of consumer surplus and producer surplus would be:
A) less than what would have accrued at the $250 price.
B) the same as what would have accrued at the $250 price.
C) more than what would have accrued at the $250 price.
D) None of the above is necessarily correct.

Answer: B
Diff: 2
Section: 13.1

9) Which of the following statements represents a key point about strategic decision making?
A) Strategy is less important in nonconstant sum games than in constant sum games.
B) The payoffs in cooperative games will always be higher than in noncooperative games.
C) It is essential to understand your opponent's point of view and to deduce his or her likely responses to your actions.
D) Optimal strategies in cooperative games always lead to economically efficient outcomes.

Answer: C
Diff: 1
Section: 13.1

10) Use the following statements to answer the question:
I. Consider the problem of negotiating the price of a rug that costs $100 to make. If there are two buyers (one with a maximum willingness–to–pay of $200 and one with a maximum willingness–to–pay of $250), then the situation is no longer a constant sum game.
II. The likely outcome from the game described in statement I is that the second buyer will bid a price slightly above $200 (e.g., $201) to win the rug.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: C
Diff: 2
Section: 13.1

11) A dominant strategy can best be described as
A) a strategy taken by a dominant firm.
B) the strategy taken by a firm in order to dominate its rivals.
C) a strategy that is optimal for a player no matter what an opponent does.
D) a strategy that leaves every player in a game better off.
E) all of the above

Answer: C
Diff: 1
Section: 13.2

12) Your economics professor has decided that your class will not be graded on a curve but on an absolute scale. Therefore, it is possible for every student in the class to get an "A." Your grade will not depend in any way on your classmates' performance. Based on this information, you decide that you should study economics three hours each day, regardless of what your classmates do. In the language of game theory, your decision to study three hours each day is:
A) a dominant strategy.
B) a minimax strategy.
C) a maximin strategy.
D) a Prisoner's dilemma.

Answer: A
Diff: 1
Section: 13.2

13) A strategy A is "dominant" for a player X if
A) strategy A contains among its outcomes the highest possible payoff in the game.
B) irrespective of any of the possible strategies chosen by the other players, strategy A generates a higher payoff than any other strategy available to player X.
C) strategy A is the best response to every strategy of the other player.
D) strategy A is the best response to the best strategy of the other player.
E) every outcome under strategy A generates positive payoffs.

Answer: C
Diff: 1
Section: 13.2

Scenario 13.2:

		ABC Inc.	
		Offer Rebate	No Rebate
XYZ Corp	Offer Rebate	20, 10	30, 0
	No Rebate	12, 16	20, 4

14) Which of the following is true about the game in Scenario 13.2?
A) ABC's dominant strategy is to offer a rebate.
B) ABC's dominant strategy is not offer a rebate.
C) XYZ's dominant strategy is to offer a rebate.
D) XYZ's dominant strategy is not offer a rebate.
E) Both ABC and XYZ have offer a rebate as a dominant strategy.

Answer: E
Diff: 2
Section: 13.2

15) In the game in Scenario 13.2, the equilibrium strategies
A) are for both firms to offer rebates.
B) is for ABC to offer a rebate, and XYZ not to offer a rebate.
C) is for XYZ to offer a rebate, and ABC not to offer a rebate.
D) are for both firms to offer no rebate.
E) does not exist in pure strategies.

Answer: A
Diff: 1
Section: 13.2

Scenario 13.3
Consider the following game:

		Zport Co.	
		Offer Lo-Profile Tires	Offer Sunroof
Moto Corp.	Offer CD Changer	40, 400	100, 200
	Offer Free Maintenance	0, 300	160, 120

16) Which of the following is true for the game in Scenario 13.3?
A) Moto's dominant strategy is the CD changer.
B) Moto's dominant strategy is the free maintenance.
C) Zport's dominant strategy is the low-profile tires.
D) Zport's dominant strategy is the sun roof.
E) Neither company has a dominant strategy.

Answer: C
Diff: 2
Section: 13.2

17) In the game in Scenario 13.3, the equilibrium outcome:
A) is for Moto to offer a CD changer and Zport to offer low-profile tires.
B) is for Moto to offer a CD changer and Zport to offer a sun roof.
C) is for Moto to offer free maintenance and Zport to offer low-profile tires.
D) is for Moto to offer free maintenance and Zport to offer a sunroof.
E) does not exist in pure strategies.

Answer: A
Diff: 2
Section: 13.2

Scenario 13.4
Consider the following game:

		Vita Bars	
		Sponsor Marathon	Sponsor TV Running Show
NRG Bars	Sponsor Marathon	5, 9	9, 6
	Sponsor TV Running Show	8, 14	3, 16

18) Which of the following is TRUE for the game in Scenario 13.4?
A) NRG's dominant strategy is to sponsor the marathon.
B) NRG's dominant strategy is to sponsor the TV show.
C) Vita's dominant strategy is to sponsor the marathon.
D) Vita's dominant strategy is to sponsor the TV show.
E) Neither company has a dominant strategy.

Answer: E
Diff: 2
Section: 13.2

19) In the game in Scenario 13.4, the equilibrium outcome:
A) is for both NRG and Vita to sponsor the marathon.
B) is for both NRG and Vita to sponsor the TV show.
C) is for NRG to sponsor the marathon and Vita to sponsor the TV show.
D) is for NRG to sponsor the TV show and Vita to sponsor the marathon.
E) does not exist in pure strategies.

Answer: E
Diff: 3
Section: 13.2

Scenario 13.5
Consider the following game:

		Bull Meat	
		Expand in the West	Expand in the South
Deer Meat	Expand in the West	10, 60	50, 90
	Expand in the South	20, 80	40, 50

20) Which of the following is true regarding the game in Scenario 13.5?
A) Only Bull Meat has a dominant strategy.
B) Only Deer Meat has a dominant strategy.
C) Both companies have a dominant strategy: expand West.
D) Both companies have a dominant strategy: expand South.
E) Neither company has a dominant strategy.

Answer: E
Diff: 2
Section: 13.2

21) In the game in Scenario 13.5,
A) there is one equilibrium: for both to expand West.
B) there is one equilibrium: for both to expand South.
C) there are two equilibria: either can expand in the West, and the other expands in the South.
D) there is only a mixed strategies equilibrium.
E) all four outcomes are equilibria.

Answer: C
Diff: 3
Section: 13.2

22) If both players in a game have dominant strategies, we say that the game has:
A) a constant sum.
B) a nonconstant sum.
C) independence of irrelevant alternatives.
D) an equilibrium in dominant strategies.

Answer: D
Diff: 1
Section: 13.2

23) Use the following statements to answer this question:
I. A player must have at least one dominant strategy in a game.
II. If neither player in a game has a dominant strategy in a game, then there is no equilibrium outcome for the game.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: D
Diff: 1
Section: 13.2

24) Consider the following game in which two firms decide how much of a homogeneous good to produce. The annual profit payoffs for each firm are stated in the cell of the game matrix, and Firm A's payoffs appear first in the payoff pairs:

	Firm B – low output	Firm B – high output
Firm A – low output	300, 250	200, 100
Firm A – high output	200, 75	75, 50

What are the dominant strategies in this game?

A) Both firms producer low levels of output
B) Both firms produce high levels of output
C) Firm A's dominant strategy is to produce low levels of output, but Firm B does not have a dominant strategy.
D) Firm B's dominant strategy is to produce low levels of output, but Firm A does not have a dominant strategy.
E) Neither firm has a dominant strategy

Answer: A
Diff: 1
Section: 13.2

25) A Nash equilibrium occurs when

A) each firm is doing the best it can given its opponents' actions.
B) each firm chooses the strategy that maximizes its minimum gain.
C) a player can choose a strategy that is optimal regardless of its rivals' actions.
D) there is no dominant firm in a market.

Answer: A
Diff: 1
Section: 13.3

26) A maximin strategy

A) maximizes the minimum gain that can be earned.
B) maximizes the gain of one player, but minimizes the gain of the opponent.
C) minimizes the maximum gain that can be earned.
D) involves a random choice between two strategies, one which maximizes potential gain and one which minimizes potential loss.

Answer: A
Diff: 1
Section: 13.3

27) Andre Agassi, a star tennis player, is playing the number one player in the world, Roger Federer. Before the match, Agassi decided that he would serve 20 percent of his serves to Federer's backhand, 30 percent of his serves to Federer's forehand, and 50 percent of his serves straight at Federer. In the language of game theory, this is known as:

A) a pure strategy.
B) a dominant strategy.
C) a mixed strategy.
D) a maximin strategy.

Answer: C
Diff: 1
Section: 13.3

28) Use the following statements to answer this question:
I. If mixed strategies are allowed, every game has at least one Nash equilibrium.
II. The maximin strategy is optimal in the game of "matching pennies."
A) Both I and II are true. B) I is true, and II is false.
C) I is false, and II is true. D) Both I and II are false.

Answer: B
Diff: 3
Section: 13.3

29) In a Nash equilibrium,
A) each player has a dominant strategy.
B) no players have a dominant strategy.
C) at least one player has a dominant strategy.
D) players may or may not have dominant strategies.
E) the player with the dominant strategy will win.

Answer: D
Diff: 3
Section: 13.3

30) Nash equilibria are stable because
A) they involve dominant strategies.
B) they involve constant–sum games.
C) they occur in noncooperative games.
D) once the strategies are chosen, no players have an incentive to negotiate jointly to change them.
E) once the strategies are chosen, no player has an incentive to deviate unilaterally from them.

Answer: E
Diff: 2
Section: 13.3

31) The relationship between a pure–strategy Nash equilibrium and a dominant–strategy equilibrium is that
A) a dominant–strategy equilibrium is a special case of a pure–strategy Nash equilibrium.
B) a pure–strategy Nash equilibrium is a special case of a dominant–strategy equilibrium.
C) they are the same.
D) there may not be a dominant–strategy equilibrium, but there always is a pure–strategy Nash equilibrium.
E) they are mutually exclusive and exhaustive, in that a dominant–strategy equilibrium is the same thing as a mixed–strategy Nash equilibrium.

Answer: A
Diff: 3
Section: 13.3

Scenario 13.6
Consider the following game: Payoffs are in millions of dollars.

		Lawrence LLP	
		Put Poison Pill In Turbo Tech	Dump Cash Assets of Zamboni Tech
ERS Corporation	Buy Turbo Tech	-$100, -$1	$2, -$0.5
	Buy Zamboni Tech	$1, -$1	-$0.5, -$0.5

32) In the game in Scenario 13.6,
A) "Poison Pill" is a dominant strategy for Lawrence LLP.
B) "Dump" is a dominant strategy for Lawrence LLP.
C) "TurboTech" is a dominant strategy for ERS Co.
D) "ZamboniTech" is a dominant strategy for ERS Co.
E) No firm has a dominant strategy.

Answer: B
Diff: 2
Section: 13.3

33) In the game in Scenario 13.6, what is the Nash equilibrium?
A) The strategy pair associated with –$100, –$1.
B) The strategy pair associated with $2, –$0.5.
C) The strategy pair associated with $1, –$1.
D) The strategy pair associated with –$0.5, –$0.5.
E) There is no Nash equilibrium in pure strategies.

Answer: B
Diff: 2
Section: 13.3

34) Refer to the game in Scenario 13.6. What will occur if ERS Co. plays a maximin strategy?
A) –$100, –$1
B) $2, –$0.5
C) $1, –$1
D) –$0.5, –$0.5
E) There is a 0.25 chance of each outcome in that case.

Answer: D
Diff: 2
Section: 13.3

Scenario 13.7:
Consider the game below about funding and construction of a dam to protect a 1,000 –person town. Contributions to the Dam Fund, once made, cannot be recovered, and all citizens must contribute $1,000 to the dam in order for it to be built. The dam, if built, is worth $70,000 to each citizen.

		One Citizen	
		Contribute to Dam	Don't Contribute to Dam
Other 999 Citizens	Contribute to Dam	$69,000, $69,000	-$1,000, $0
	Don't Contribute to Dam	$0, -$1,000	$0, $0

35) In the game in Scenario 13.7, the strategy pair that pays
A) $69,000 to each player is the only equilibrium.
B) ($0, –$1000) is the only equilibrium.
C) (–$1000, $0) is the only equilibrium.
D) $0 to each player is the only equilibrium.
E) $69,000 to each player and the strategy pair that pays $0 to each player are equilibria.

Answer: E
Diff: 2
Section: 13.3

36) Refer to the game in Scenario 13.7. If each player chose a maximin strategy, the outcome would be
A) $69,000, $69,000.
B) $0, –$1000.
C) –$1000, $0.
D) $0, $0.
E) a mixed strategy equilibrium.

Answer: D
Diff: 2
Section: 13.3

Scenario 13.8
Consider the following game:

		IVY Corp	
		Business Plan Y	Business Plan Z
SAC Group	Business Plan A	\$1, \$10	\$1, -\$5,000
	Business Plan B	\$2, \$0	\$2, \$2

37) The game in Scenario 13.8 is
A) variable–sum.
B) constant–sum.
C) cooperative.
D) a Prisoner's Dilemma.
E) a Conjoint Crux.

Answer: A
Diff: 1
Section: 13.3

38) In game in Scenario 13.8,
A) Y is a dominant strategy for IVY Corp.
B) Z is a dominant strategy for IVY Corp.
C) A is a dominant strategy for SAC Group.
D) B is a dominant strategy for SAC Group.
E) No firm has a dominant strategy.

Answer: D
Diff: 2
Section: 13.3

39) In game in Scenario 13.8, what is the Nash equilibrium?
A) The strategy pair associated with \$1, \$10.
B) The strategy pair associated with \$2, \$0.
C) The strategy pair associated with \$1, –\$5000.
D) The strategy pair associated with \$2, \$2.
E) There is no Nash equilibrium in pure strategies.

Answer: D
Diff: 2
Section: 13.3

40) In game in Scenario 13.8, what will occur if IVY Corp. plays a maximin strategy?
A) \$1, \$10
B) \$1, –\$5000
C) \$2, \$0
D) \$2, \$2
E) There is a .25 chance of each outcome in that case.

Answer: C
Diff: 2
Section: 13.3

Scenario 13.9
Consider the following game:

Two firms are situated next to a lake, and it costs each firm $1,500 per period to use filters that avoid polluting the lake. However, each firm must use the lake's water in production, so it is also costly to have a polluted lake. The cost to each firm of dealing with water from a polluted lake is $1,000 times the number of polluting firms.

		Nessie, Corp.	
		Pollute	Don't Pollute
Lago, Inc.	Pollute	-$2,000, -$2,000	-$1,000, -$2,500
	Don't Pollute	-$2,500, -$1,000	-$1,500, -$1,500

41) What is true about dominant strategies in the game in Scenario 13.9?
A) "Pollute" is a dominant strategy for both firms.
B) "Pollute" is a dominant strategy for Lago only.
C) "Don't Pollute" is a dominant strategy for both firms.
D) "Don't Pollute" is a dominant strategy for Lago only.
E) There are no dominant strategies.

Answer: A
Diff: 2
Section: 13.3

42) Refer to Scenario 13.9. What kind of game is being played by Lago and Nessie?
A) Battle of the Sexes.
B) Prisoner's Dilemma.
C) Beach Location.
D) Stackelberg Output Choice.
E) Cournot Output Choice.

Answer: B
Diff: 1
Section: 13.3

43) Refer to Scenario 13.9. The equilibrium of this game, if played only once, is that
A) both firms pollute.
B) only Lago pollutes.
C) only Nessie pollutes.
D) neither firm pollutes.
E) the firms choose a mixed strategy.

Answer: A
Diff: 2
Section: 13.3

44) Refer to Scenario 13.9. If this game is repeated over an infinite or uncertain horizon, the most likely observed behavior will be that
A) both firms pollute.
B) only Lago pollutes.
C) only Nessie pollutes.
D) neither firm pollutes.
E) the firms alternate polluting in different periods.

Answer: D
Diff: 1
Section: 13.3

45) A "mixed strategy" equilibrium means that
A) the strategies chosen by the players represent different behaviors.
B) one player has a dominant strategy, and one does not.
C) one player has a pure strategy, and one does not.
D) the equilibrium strategy is an assignment of probabilities to pure strategies.
E) the equilibrium strategy involves alternating between a dominant strategy and a Nash strategy.

Answer: D
Diff: 1
Section: 13.3

Scenario 13.10
Consider the game below:

		Moma's Pop	
		Have a Sweepstakes	Create a Diet Soda
Weasel's Pop	Use More Caffeine	-5, 5	10, -10
	Use Animal-Shaped Bottles	8, -8	0, 0

46) What is true about dominant strategies in the game in Scenario 13.10?
A) "Use more caffeine" and "have a sweepstakes" are dominant strategies.
B) "Use more caffeine" and "create a diet soda" are dominant strategies.
C) "Make animal–shaped bottles" and "have a sweepstakes" are dominant strategies.
D) "Make animal–shaped bottles" and "create a diet soda" are dominant strategies.
E) There are no dominant strategies.

Answer: E
Diff: 2
Section: 13.3

47) The game in Scenario 13.10 is
A) variable–sum.
B) constant–sum.
C) cooperative.
D) a Prisoners' Dilemma.
E) a Cournot Production Cross.

Answer: B
Diff: 1
Section: 13.3

48) Which of the below outcomes is the result of a Nash equilibrium in pure strategies for the game in Scenario 13.10?
A) –5, 5
B) 10, –10
C) 8, –8
D) 0, 0
E) There is no pure strategy equilibrium in this game.

Answer: E
Diff: 2
Section: 13.3

49) In the game in Scenario 13.10, there is
A) a mixed strategy equilibrium, and no other.
B) a mixed strategy and a pure strategy equilibrium.
C) a mixed strategy and two pure strategy equilibria.
D) a mixed strategy and four pure strategy equilibrium.
E) no equilibrium in either mixed or pure strategies.

Answer: A
Diff: 3
Section: 13.3

50) The Matching Pennies game is an example of a:
A) constant–sum game.
B) nonconstant sum game.
C) game with an equilibrium in dominant strategies.
D) none of the above

Answer: A
Diff: 1
Section: 13.3

51) Consider the Matching Pennies game:

	Player B – heads	Player B – tails
Player A – heads	1, –1	–1, 1
Player A – tails	–1, 1	1, –1

Suppose Player B always uses a mixed strategy with probability of 3/4 for head and 1/4 for tails. Which of the following strategies for Player A provides the highest expected payoff?
A) Mixed strategy with probability 1/4 on heads and 3/4 on tails
B) Mixed strategy with probability 1/2 on heads and 1/2 on tails
C) Mixed strategy with probability 3/4 on heads and 1/4 on tails
D) Pure strategy in which Player A always selects heads

Answer: D
Diff: 3
Section: 13.3

52) Consider the Matching Pennies game:

	Player B – heads	Player B – tails
Player A – heads	1, –1	–1, 1
Player A – tails	–1, 1	1, –1

Suppose Player A always uses a pure strategy that selects heads. What is Player B's optimal response to this pure strategy?

A) Always select heads.
B) Always select tails.
C) Mixed strategy with probability 1/2 on heads and 1/2 on tails
D) There is no optimal pure or mixed strategy for this situation.

Answer: B
Diff: 2
Section: 13.3

53) Consider the Matching Pennies game:

	Player B – heads	Player B – tails
Player A – heads	1, –1	–1, 1
Player A – tails	–1, 1	1, –1

Suppose Player A always uses a pure strategy that selects heads, and Player B always uses a pure strategy that selects tails. Is this outcome a Nash equilibrium?

A) Yes, both players have no incentive to change their actions.
B) No, Player A would want to switch to tails.
C) No, Player B would want to switch to heads.
D) No, Player B would want to switch to tails.

Answer: B
Diff: 2
Section: 13.3

54) Consider the Matching Pennies game:

	Player B – heads	Player B – tails
Player A – heads	1, –1	–1, 1
Player A – tails	–1, 1	1, –1

Suppose both players use maximin strategies for this game. Is there a clear equilibrium outcome to the game in this case?

A) Yes, both players select heads
B) Yes, both players select tails
C) No, both players face the minimum payoff (–1) under both actions.
D) We do not have enough information to answer this question.

Answer: C
Diff: 2
Section: 13.3

55) A "Credible Threat"
A) is also called a "tit–for–tat" strategy.
B) always set a low price.
C) minimizes the return of your opponent.
D) is a strategy selection that is in your best interest.
E) provides the best return for both players.

Answer: D
Diff: 2
Section: 13.4

56) Repetition of a game
A) yields the same outcome, over and over.
B) can result in behavior that is different from what it would be if the game were played only once.
C) is not possible.
D) makes cooperative games into non–cooperative games.
E) is possible only if the payoffs in the matrix change.

Answer: B
Diff: 1
Section: 13.4

57) The strategy that worked best in Axelrod's experiments using the Prisoners' Dilemma game was to
A) play the "cooperate" ("don't confess") strategy.
B) play the "defect" ("confess") strategy.
C) alternate between "cooperate" and "defect" strategies.
D) play the "cooperate" strategy at first, and from then on do whatever the other player did in the previous round, cooperating if the other player did, and defecting if the other player did.
E) play the "cooperate" strategy in the first round, and from then on cooperate so long as the other player does, but if the other player defects, then play the "defect" strategy from that time forward.

Answer: D
Diff: 1
Section: 13.4

58) It can be rational to play tit–for–tat in a repeated Prisoners' Dilemma game
A) only if the game is played an infinite number of times.
B) if the game is played an infinite number of times, or if it is uncertain how many times it will be played.
C) only if the game is played a finite number of times, and that number is known by all the players in advance.
D) for n–1 of the n periods it will be played, if n is known in advance.
E) at no time; tit–for–tat is an irrational strategy in this situation.

Answer: B
Diff: 1
Section: 13.4

Scenario 13.11
Consider the game below:

		Player C	
		Strategy C1	Strategy C2
Player R	Strategy R1	600, 600	100, 1000
	Strategy R2	1000, 100	200, 200

59) What is true about dominant strategies in the game in Scenario 13.11?
A) R1 and C1 are dominant strategies.
B) R1 and C2 are dominant strategies.
C) R2 and C1 are dominant strategies.
D) R2 and C2 are dominant strategies.
E) There are no dominant strategies.

Answer: D
Diff: 2
Section: 13.4

60) What kind of game is shown in Scenario 13.11?
A) Axelrod's Paradox
B) Stackelberg Match
C) Prisoners' Dilemma
D) Cournot's Duopoly Game
E) It is not possible to tell what kind of game it is because the strategies have not been identified.

Answer: C
Diff: 1
Section: 13.4

61) In the game in Scenario 13.11, equilibrium is
A) R1, C1.
B) R1, C2.
C) R2, C1.
D) R2, C2.
E) a mixed strategy based on all four pure strategies.

Answer: D
Diff: 2
Section: 13.4

62) When cost and demand are stable over time in an industry, repetition of Prisoners' Dilemma situations
A) can yield cooperative outcomes because firms can explicitly collude to set prices.
B) can yield cooperative outcomes even when firms do not explicitly collude to set prices.
C) cooperative or noncooperative outcomes may occur, but cooperation is harder than when the market is unstable.
D) will tend to yield noncooperative outcomes.
E) will always yield noncooperative outcomes.

Answer: B
Diff: 1
Section: 13.4

63) For infinitely repeated games in which the players follow a tit–for–tat strategy, which one of the following outcomes is NOT possible?
A) The players cooperate with one another until someone decides to not cooperate, and then the other players will not cooperate for some period of time.
B) There can be dominant strategies.
C) If the information about another player's action is limited, then some cooperative actions may be incorrectly interpretted as "not cooperate."
D) All of the above are possible outcomes.

Answer: D
Diff: 2
Section: 13.4

64) Once the state environmental protection agency devises its new policy to protect the environment, firms decide whether to remain in the state or move their operations to a neighboring state. In the language of game theory, this is an example of:
A) a cooperative game.
B) a sequential game.
C) a threat.
D) the Prisoner's dilemma.

Answer: B
Diff: 1
Section: 13.5

65) A "sequential game" is
A) another term for a repeated game.
B) another term for a cooperative game.
C) the term for a game in which individuals receive their payoffs at different times.
D) the term for a game in which individuals do not commit to strategy choices at the same time.
E) the term for a game in which each outcome occurs, one after the other, as the game is repeated over time.

Answer: D
Diff: 2
Section: 13.5

66) In the sequential version of a game using the same players, the same strategies, and the same possible outcomes as the original game, the equilibrium
A) may be different than in the original game.
B) must be different than in the original game.
C) will be the same as in the original game.
D) is the same as the cooperative version of the original game.
E) is the same as the noncooperative version of the original game.

Answer: A
Diff: 3
Section: 13.5

67) An oligopolistic situation involving the possible creation of barriers to entry would probably best be modeled by a
A) cooperative game.
B) Prisoners' Dilemma game.
C) Battle of the Sexes game.
D) repeated game.
E) sequential game.

Answer: E
Diff: 1
Section: 13.5

68) What does it mean to say that a game is in "extensive form"?
A) Strategies are described, rather than just numbered.
B) All payoffs are shown.
C) The game is presented as a matrix.
D) The game is presented as a decision tree.
E) The game is written out as often as the situation calls for it to be played.

Answer: D
Diff: 1
Section: 13.5

Scenario 13.12
Consider the game below:

		Player C	
		Strategy C1	Strategy C2
Player R	Strategy R1	600, 600	100, 1000
	Strategy R2	1000, 100	200, 200

69) Playing the game in Scenario 13.12 sequentially would
A) not change the equilibrium.
B) change the equilibrium to (R1,C1).
C) change the equilibrium to (R2,C1) if R moved first.
D) change the equilibrium to (R2,C1) if C moved first.
E) change the equilibrium to (R2,C2).

Answer: A
Diff: 3
Section: 13.5

70) Playing the game in Scenario 13.12 by using a maximin strategy would
A) not change the equilibrium from the equilibrium of the original game.
B) change the equilibrium to (R1,C2).
C) change the equilibrium to (R2,C1) if R moved first.
D) change the equilibrium to (R2,C1) if C moved first.
E) change the equilibrium to (R2,C2).

Answer: A
Diff: 2
Section: 13.5

71) If the Battle of the Sexes game were played sequentially,
A) one of the two pure strategy equilibria would become the only equilibrium.
B) the two pure strategy equilibria would alternate in being the equilibrium seen in each round of the game.
C) only the mixed strategy equilibrium would exist.
D) only the dominant strategy equilibrium would exist.
E) the equilibrium would not change.

Answer: A
Diff: 2
Section: 13.5

Scenario 13.13
Consider the game below:

		Player C	
		Strategy C1	Strategy C2
Player R	Strategy R1	50, 50	800, 800
	Strategy R2	1000, 1000	100, 100

72) If the game in Scenario 13.13 were not played sequentially,
A) the only equilibrium would be (R2,C1).
B) the only equilibrium would be (R1,C2).
C) the only equilibria would be (R2,C1) and (R1,C2).
D) the only equilibria would be (R2,C1), (R1,C2) and a mixed strategy equilibrium.
E) there would not be any equilibrium.

Answer: D
Diff: 2
Section: 13.5

73) Playing the game in Scenario 13.13 sequentially would
A) not change the equilibrium.
B) change the equilibrium to (R1,C1).
C) change the equilibrium to (R2,C1) if R moved first.
D) change the equilibrium to (R2,C1) if C moved first.
E) change the equilibrium to (R2,C2).

Answer: C
Diff: 2
Section: 13.5

74) What kind of game is shown in Scenario 13.13?
A) Battle of the Sexes.
B) Matching Pennies.
C) Prisoners' Dilemma.
D) The Product Choice game.
E) It is not possible to tell what kind of game it is because the strategies have not been identified.

Answer: D
Diff: 1
Section: 13.5

75) Which is true of output–choice models of oligopoly behavior?
A) Both the Stackelberg and Cournot models can be constructed as sequential games.
B) The Stackelberg, but not the Cournot, model can be constructed as a sequential game.
C) The Cournot, but not the Stackelberg, model can be constructed as a sequential game.
D) Neither the Cournot nor the Stackelberg model can be constructed as a sequential game, but other output–choice models can be.
E) There is no relationship between any output–choice model and sequential games.

Answer: B
Diff: 1
Section: 13.5

Scenario 13.14
Consider the game below:

		Player C		
		Q=50	Q=100	Q=150
Player R	Q=50	37, 37	30, 40	20, 37
	Q=100	40, 30	32, 32	15, 25
	Q=150	37, 20	25, 15	0, 0

76) The game in Scenario 13.14
A) is Stackelberg if both players move at the same time; Cournot if one player moves first.
B) is Cournot if both players move at the same time; Stackelberg if one player moves first.
C) Stackelberg no matter what the timing of moves.
D) Cournot no matter what the timing of moves.
E) is neither Stackelberg nor Cournot.

Answer: B
Diff: 1
Section: 13.5

77) In the game in Scenario 13.14,
A) R's dominant strategy is Q = 100; C has none.
B) C's dominant strategy is Q = 100; R has none.
C) Q = 100 is a dominant strategy for both R and C.
D) Q = 100 dominates Q =150 for both firms.
E) the dominant strategy for both players is to choose the same level of output, so long as it is not 150.

Answer: D
Diff: 3
Section: 13.5

78) What is true of equilibrium in the game in Scenario 13.14?
A) In equilibrium, both firms choose Q = 50.
B) In equilibrium, both firms choose Q = 100.
C) There are two equilibria, at Q = 50 and at Q = 100.
D) The only equilibrium is in mixed strategies.
E) The two equilibria are those associated with the (40,30) outcome and the (30,40) outcome.

Answer: B
Diff: 3
Section: 13.5

79) In the game in Scenario 13.14, each firm has a strategy that would not be chosen under any circumstances. This strategy is
A) Q = 50.
B) Q = 100.
C) Q = 150.
D) "choose the same Q as the other player."
E) "choose a Q different from the other player's."

Answer: C
Diff: 2
Section: 13.5

80) When, in the game in Scenario 13.14, the strategy that would not be chosen under any circumstances is removed, what is left is a
A) Battle of the Sexes game.
B) Matching Pennies game.
C) Prisoners' Dilemma game.
D) Beach Location game.
E) constant–sum game.

Answer: C
Diff: 1
Section: 13.5

81) If, in the game in Scenario 13.14, R moves first, it will select
A) Q = 50.
B) Q = 100.
C) Q = 150.
D) a mixed strategy over the three choices that includes some positive likelihood for each Q.
E) a mixed strategy over the choices Q = 50 and Q = 100.

Answer: C
Diff: 2
Section: 13.5

82) If, in the game in Scenario 13.14, R moves first, C will respond with
A) Q = 50.
B) Q = 100.
C) Q = 150.
D) a mixed strategy over the three choices that includes some positive likelihood for each Q.
E) a mixed strategy over the choices Q = 50 and Q = 100.

Answer: A
Diff: 2
Section: 13.5

83) Relative to a simultaneous–move situation, the gain to firm R from being able to move first in the game in Scenario 13.14, would be
A) 40. B) 37. C) 32. D) 5. E) 3.

Answer: D
Diff: 2
Section: 13.5

84) Relative to a simultaneous–move situation, the loss to firm C from having to move second in the game in Scenario 13.14, would be

A) 37. B) 20. C) 12. D) 8. E) 5.

Answer: C
Diff: 2
Section: 13.5

85) If player R moves first in the game in Scenario 13.14, the equilibrium will

A) not be different from what it is in the simultaneous–move scenario.
B) be to R's detriment because it will not be able to react to C's choice.
C) be one in which R chooses 50 and C chooses 150.
D) be one in which R chooses 100 and C chooses 50.
E) be one in which R chooses 150 and C chooses 50.

Answer: E
Diff: 2
Section: 13.5

86) Consider the following game that represents the payoffs from different advertising campaigns (low, medium, and high spending) for two political candidates that are running for a particular office. The values in the payoff matrix represent the share of the popular vote earned by each candidate:

	Candidate B – low	Candidate B – medium	Candidate B – hig
Candidate A – low	50, 50	40, 60	80, 20
Candidate A – medium	60, 40	50, 50	35, 65
Candidate A – high	80, 20	65, 35	50, 50

Under the version of the game with simultaneous moves, what is the Nash equilibrium?

A) Neither candidate has a dominant strategy, but the Nash equilibrium occurs where both candidates use medium advertising campaigns.
B) Candidate A's dominant strategy is high, Candidate B's dominant strategy is high, and this is the Nash equilibrium.
C) Neither candidate has a dominant strategy, but the Nash equilibrium occurs where both candidates use high advertising campaigns.
D) There is no Nash equilibrium (in pure strategies) for this simultaneous game.

Answer: B
Diff: 2
Section: 13.5

87) Consider the following game that represents the payoffs from different advertising campaigns (low, medium, and high spending) for two political candidates that are running for a particular office. The values in the payoff matrix represent the share of the popular vote earned by each candidate:

	Candidate B – low	Candidate B – medium	Candidate B – hig
Candidate A – low	50, 50	40, 60	80, 20
Candidate A – medium	60, 40	50, 50	35, 65
Candidate A – high	80, 20	65, 35	50, 50

Under the version of the game in which Candidate A moves first, what is the Nash equilibrium?

A) The Nash equilibrium occurs where both candidates use medium advertising campaigns.
B) Candidate A's strategy is low, and Candidate B responsed with a high advertising campaign.
C) The Nash equilibrium for the sequential and simultaneous versions of the game are identical.
D) There is no Nash equilibrium (in pure strategies) for this sequential game.

Answer: C
Diff: 2
Section: 13.5

88) Wal–Mart was one of the most successful firms of the 1970s and 1980s. Much of Wal–Mart's success can be credited to its expansion strategy: they rushed to open the first discount store in small towns that could only support one discount store. In the language of game theory:

A) Wal–Mart was a dominant firm.
B) Wal–Mart made empty threats.
C) Wal–Mart employed a maximin strategy.
D) Wal–Mart employed a preemptive strategy.

Answer: D
Diff: 1
Section: 13.6

89) As defined by Thomas Schelling, a "strategic move" is

A) any strategy choice in a game.
B) any strategy choice consistent with Nash equilibrium.
C) any strategy choice in a sequential game.
D) a strategy choice that influences the subsequent strategy choice of another player.
E) a strategy choice that restricts the set of outcomes available to another player.

Answer: D
Diff: 1
Section: 13.6

Scenario 13.15
Consider the pricing game below:

		Boring Books	
		\$70 Econ Books	\$25 Econ Books
Simple Texts	\$80 Econ Books	\$500, \$400	\$400, \$500
	\$25 Econ Books	\$100, \$0	\$50, \$100

90) Which is true about dominant strategies in the game in Scenario 13.15?
A) \$80 is dominant for Simple; \$70 is dominant for Boring.
B) \$80 is dominant for Simple; \$25 is dominant for Boring.
C) \$35 is dominant for Simple; \$70 is dominant for Boring.
D) \$35 is dominant for Simple; \$25 is dominant for Boring.
E) There are no dominant strategies in the above game.

Answer: B
Diff: 2
Section: 13.6

91) Refer to Scenario 13.15. If the firms price simultaneously, equilibrium would be
A) an \$80 price for Simple and a \$70 price for Boring.
B) an \$80 price for Simple and a \$25 price for Boring.
C) a \$35 price for Simple and a \$70 price for Boring.
D) a \$35 price for Simple and a \$25 price for Boring.
E) a mixed strategy equilibrium.

Answer: B
Diff: 2
Section: 13.6

92) If Simple were able to move first in a sequential version of the game in Scenario 13.15, the equilibrium would be
A) an \$80 price for Simple and a \$70 price for Boring.
B) an \$80 price for Simple and a \$25 price for Boring.
C) a \$35 price for Simple and a \$70 price for Boring.
D) a \$35 price for Simple and a \$25 price for Boring.
E) a mixed strategy equilibrium.

Answer: B
Diff: 2
Section: 13.6

93) If Boring were able to move first in a sequential version of the game in Scenario 13.15, the equilibrium would be
A) an \$80 price for Simple and a \$70 price for Boring.
B) an \$80 price for Simple and a \$25 price for Boring.
C) a \$35 price for Simple and a \$70 price for Boring.
D) a \$35 price for Simple and a \$25 price for Boring.
E) a mixed strategy equilibrium.

Answer: B
Diff: 2
Section: 13.6

94) What is true about threats in the game in Scenario 13.15?
A) Simple can change the equilibrium by means of a credible threat; Boring cannot.
B) Boring can change the equilibrium by means of a credible threat; Simple cannot.
C) Boring can change the equilibrium by means of a credible threat only if it can move before Simple.
D) Simple can change the equilibrium by means of a credible threat only if it can move before Boring.
E) Neither firm has a credible threat with which to change this equilibrium.

Answer: E
Diff: 2
Section: 13.6

Scenario 13.16
Consider the pricing game below:

		Ici Cones	
		Buy Gelato Machines	Buy Yogurt Machines
Gooi Cones	Buy Gelato Machines	\$150, \$0	\$150, \$300
	Buy Yogurt Machines	\$400, \$150	\$50, \$50

95) What is true about dominant strategies in the game in Scenario 13.16?
A) Gelato is a dominant strategy for both firms.
B) Yogurt is a dominant strategy for Gooi only.
C) Yogurt is a dominant strategy for Ici only.
D) Yogurt is a dominant strategy for both firms.
E) There are no dominant strategies in the above game.

Answer: E
Diff: 2
Section: 13.6

96) Refer to Scenario 13.16. If the firms must choose their prices simultaneously,
A) both firms will buy gelato.
B) both firms will buy yogurt.
C) two pure strategy equilibria exist, one in which Gooi alone buys a gelato machine and one in which Ici alone buys a gelato machine.
D) the game has no pure strategy equilibrium.
E) the game has no mixed strategy equilibrium.

Answer: C
Diff: 2
Section: 13.6

97) Refer to Scenario 13.16. If Gooi moves first, the payoff in equilibrium will be
A) $150, $0.
B) $150, $300.
C) $400, $150.
D) $50, $50.
E) $650, $450.

Answer: C
Diff: 2
Section: 13.6

98) Refer to Scenario 13.16. If Gooi can move first, and Ici threatens to buy yogurt machines, no matter what Gooi does,
A) Gooi will have to buy gelato machines, so Ici will get its highest possible profit.
B) Gooi will buy yogurt machines, which it otherwise wouldn't have, in order to retaliate.
C) the equilibrium payoff of ($50,$50) will be enforced.
D) Gooi will not change its behavior, because Ici's threat is not credible.
E) Gooi will threaten to buy yogurt machines, no matter what Ici does, to see whether that will get the people at Ici to change their minds.

Answer: D
Diff: 2
Section: 13.6

99) Refer to Scenario 13.16. If Gooi can move first, and Ici wants to realize the ($150, $300) payoff,
A) all it has to do is threaten to buy yogurt machines, no matter what Gooi does.
B) it could make its threat credible by rearranging its physical plant so that the installation of gelato machines would bring in profit less than $50.
C) it could make its threat credible by rearranging its physical plant so that the installation of gelato machines would bring in profit less than $150.
D) it could make its threat credible by rearranging its physical plant so that the installation of gelato machines would bring in profit less than $300.
E) it has to move before Gooi; there is no other way.

Answer: B
Diff: 2
Section: 13.6

100) To deter a potential entrant, an existing firm in a market may threaten to sharply increase production so that the entrant will be left with a small share of the market. This may be a credible threat if:
A) production exhibits economies of scale.
B) production exhibits diseconomies of scale.
C) production costs may fall due to learning–by–doing.
D) A and C are correct.
E) B and C are correct.

Answer: E
Diff: 2
Section: 13.6

101) To deter a potential entrant, an existing firm in a market may threaten to sharply increase production so that the entrant will be left with a small share of the market. The firm can make this threat credible by limiting its own options, and possible actions of this type include:
A) signing long–term sales contracts that commit the firm to high levels of output.
B) building a very large factory that could potentially produce enough output to meet most of the market demand.
C) signing long–term purchase contracts for large amounts of production inputs.
D) all of the above

Answer: D
Diff: 2
Section: 13.6

102) La Tortilla is the only producer of tortillas in Santa Teresa. The firm produces 10,000 tortillas each day and has the capacity to increase production to 100,000 tortillas each day. La Tortilla has made a large profit for years, but no other firm has chosen to compete in the Santa Teresa tortilla market. La Tortilla has been able to deter entry because if other firms were to enter the market it would greatly step–up production and reduce price.
A) La Tortilla's behavior is inconsistent with economic theory.
B) La Tortilla has been successful because of its credible threat.
C) La Tortilla behaves like a Stackelberg firm.
D) La Tortilla must have other barriers to entry to protect its monopoly power.

Answer: B
Diff: 2
Section: 13.7

Scenario 13.17
Consider the entry–deterrence game below. The potential entrant would have to spend some amount in sunk costs to enter the market.

		Potential Entrant	
		Enter Market	Stay Out of Market
Incumbent Monopoly	Accommodate	300, 60	600, 0
	War (Low Price)	180, -60	240, 0

103) In the game in Scenario 13.17, who moves first?
A) Potential Entrant
B) Incumbent Monopoly
C) It's a sequential game; firms alternate moving first.
D) Both players move simultaneously.
E) Who moves first is decided by the equilibrium.

Answer: A
Diff: 1
Section: 13.7

104) In the game in Scenario 13.17, Incumbent Monopoly has
A) an incentive to threaten accommodation, which would be credible.
B) an incentive to threaten war, which would be credible.
C) an incentive to threaten accommodation, which wouldn't be credible.
D) an incentive to threaten war, which wouldn't be credible.
E) no incentive to make a threat.

Answer: D
Diff: 2
Section: 13.7

105) If the game in Scenario 13.17 were to be infinitely repeated, waging a price war might be a rational strategy
A) because there would be no short-term losses.
B) because the short-term losses might be outweighed by long-term gains from preventing entry.
C) if the potential entrant were irrational.
D) if the monopolist had excess capacity.
E) if there were no sunk costs to the potential entrant.

Answer: B
Diff: 2
Section: 13.7

106) Refer to Scenario 13.17. If the Incumbent Monopoly installed excess capacity in advance of the Potential Entrant's appearance on the scene, and this excess capacity had a cost of $X, it would reduce by $X the Incumbent Monopoly's payoffs in the
A) top row.
B) bottom row.
C) left column.
D) right column.
E) entire matrix.

Answer: E
Diff: 2
Section: 13.7

107) The two largest auto manufacturers, Toyota and GM, have experimented with electric cars in the past, and they are currently considering the decision to introduce an electric car into the commercial automobile market. The payoffs from the possible actions are measured in millions of dollars per year, and the possible outcomes are summarized in the following game matrix:

	GM produces	GM does not produce
Toyota produces	–10, –10	50, 0
Toyota does not produce	0, 40	0, 0

If both firms enter the market simultaneously, what is the Nash equilibrium?

A) Toyota produces and GM does not produce.
B) GM produces and Toyota does not produce.
C) There are two Nash equilibria – GM produces and Toyota does not produce, or Toyota produces and GM does not produce.
D) There is no Nash equilibrium in this game.

Answer: C
Diff: 1
Section: 13.7

108) The two largest auto manufacturers, Toyota and GM, have experimented with electric cars in the past, and they are currently considering the decision to introduce an electric car into the commercial automobile market. The payoffs from the possible actions are measured in millions of dollars per year, and the possible outcomes are summarized in the following game matrix:

	GM produces	GM does not produce
Toyota produces	–10, –10	50, 0
Toyota does not produce	0, 40	0, 0

Suppose the Japanese government provides a $15 million subsidy to Toyota if the company delivers an electric auto (regardless of GM's action). What is the Nash equilibrium based on the subsidized payoffs?

A) Toyota's dominant strategy is to produce, and GM is deterred and does not produce.
B) Toyota's dominant strategy is to produce, and GM also produces the electric auto.
C) The outcome of the game is the same as before, and there are two Nash equilibria – GM produces and Toyota does not produce, or Toyota produces and GM does not produce.
D) There is no Nash equilibrium in this game.

Answer: A
Diff: 2
Section: 13.7

109) Your firm needs a private investigator and the best private eye in Santa Teresa is Kinsey Milhone. Her services are worth $30,000 to your firm but you do not want to pay her more than $10,000. You tell Kinsey that you cannot pay her more than $10,000 unless you get prior approval from the Board of Directors of your company, and, unfortunately, they just met and won't meet again for 6 months. This strategic move on your part gives you _____ flexibility and _____ bargaining power.

A) less, less B) less, more C) more, less D) more, more

Answer: B
Diff: 1
Section: 13.7

110) In a two person bargaining situation it is

A) always in the best interests of both players for each player to be as flexible as possible, and to have as many options as possible.
B) always in the best interest of the player that moves first to be as flexible as possible, and to have as many options as possible.
C) often in the best interest of players to pretend a game is noncooperative when it is not, and vice versa.
D) often in the best interest of players to cut off some of their own options in order to make the other player's threats not credible.
E) often in the best interest of players to cut off some of their own options in order to make their own threats credible.

Answer: E
Diff: 2
Section: 13.7

111) A situation in which a bidder over–values an auction item and is worse off because their bid is too high is known as the:

A) Ellsberg Paradox. B) winner's curse.
C) Arrow Impossibility Theorem. D) curse of the commons.

Answer: B
Diff: 2
Section: 13.8

112) An auction in which a seller begins by offering an item for sale at a relatively high price and then reduces the price by fixed amounts until receiving a bid is known as a:

A) Dutch auction. B) English auction.
C) second–price auction. D) sealed–bid auction.

Answer: A
Diff: 1
Section: 13.8

113) Use the following statements to answer this question:

I. The expected revenue generated by first–price and second–price sealed–bid auctions is the same.

II. The winner's curse implies that the buyer of an auctioned item will likely be the person who made the largest positive error in their estimated value of the item.

A) I and II are true. B) I is true and II is false.

C) II is true and I is false. D) I and II are false.

Answer: A
Diff: 2
Section: 13.8

114) BuyRight is a chain of grocery stores operating in small cities throughout the southwestern United States. BuyRight's major competition comes from another chain, Acme Food Stores. Both firms are currently contemplating their advertising strategy for the region. The possible outcomes are illustrated by the payoff matrix below.

		Acme Foods	
		Increase Advertising	Don't Increase Advertising
Buy-right	Increase Advertising	20, 15	35, -5
	Don't Increase Advertising	2, 30	25, 25

Entries in the payoff matrix are profits. BuyRight's profit is before the comma, Acme's is after the comma.

a. Describe what is meant by a dominant strategy.
b. Given the payoff matrix above, does each firm have a dominant strategy?
c. Under what circumstances would there be no dominant strategy for one or both firms?

Answer: ***a.***
A dominant strategy is one that is optimal regardless of the rival's strategy.

b.
For both firms, the dominant strategy is to increase advertising.
If Acme increases advertising, Buy–Right earns 20 by increasing, 2 by not increasing.
Profit is higher for Buy–Right by increasing, regardless of Acme's choice. The same can be shown to be true for Acme.

c.
Either or both firms would not have a dominant strategy if their best choice depended on the choice of their rival.

Diff: 2
Section: 13.2

115) Two firms at the St. Louis airport have franchises to carry passengers to and from hotels in downtown St. Louis. These two firms, Metro Limo and Urban Limo, operate nine passenger vans. These duopolists cannot compete with price, but they can compete through advertising. Their payoff matrix is below:

		United Limo	
		Increase Advertising	Don't Increase Advertising
Metro Limo	Increase Advertising	25, 15	30, 0
	Don't Increase Advertising	15, 20	40, 5

a. Does each firm have a dominant strategy? If so, explain and what that strategy is.
b. What is the Nash equilibrium? Explain where the Nash equilibrium occurs in the payoff matrix.

Answer: ***a.***
Metro Limo has no dominant strategy. If United Limo advertises, then Metro does best by advertising; but if United does not advertise, then Metro should not advertise. United has a dominant strategy, and it should advertise.

b.
The Nash equilibrium is for both firms to advertise. Each does best, 25 and 15, respectively, by advertising, given what the other firm does.

Diff: 2
Section: 13.3

116) Consider two firms, X and Y, that produce super computers. Each can produce the next generation super computer for the military (M) or for civilian research (C). However, only one can successfully produce for both markets simultaneously. Also, if one produces M, the other might not be able to successfully produce M, because of the limited market. The following payoff matrix illustrates the problem.

		Firm Y	
		M	C
Firm X	M	2, 1	2, 2
	C	1, 1	3, 2

a. Find the Nash equilibrium, and explain why it is a Nash equilibrium.
b. If Firm X were unsure that the management of Firm Y were rational, what would Firm X choose to do if it followed a maximin strategy? What would both firms do if they both followed a maximin strategy?

Answer: ***a.***

The Nash equilibrium occurs at the bottom right on the C,C position. Firm Y has a dominant strategy to always target the civilian research market, and Firm X's does not have a dominant strategy. However, Firm X's best response to Firm Y's dominant strategy is to also target the civilian market. In this position, each firm does its best given what the other firm does.

b.

Firm X would find the maximum of the minimum payoffs. If Firm X chose M, the minimum payoff for X would be 2. If Firm X chose C, then the minimum payoff for X would be 1. Thus, the maximum would be 2. Firm X should choose M. If both firms followed a maximin strategy, then the top right corner 2,2 would be the outcome.

Diff: 2
Section: 13.3

117) G.C. Donovan Company is a large pharmaceutical company located in the U.S., but with worldwide sales. Donovan has recently developed two new medications that have been licensed for sale in European Union countries. One medication is an over–the–counter cold preparation that effectively eliminates all cold symptoms, while the other is an antibiotic that is effective against drug resistant bacteria. A European firm, Demtech Limited, has developed drugs that are similar to Donovan's and will be ready for the European market at approximately the same time. Liability concerns make it unlikely that either firm will choose to market both new drugs at this time. Both firms do plan to market one of the drugs this year.

Donovan's managers consider their own lack of reputation among European physicians to be an important obstacle in the antibiotic market. Consequently, Donovan feels more comfortable marketing the cold preparation. Demtech, on the other hand, has an excellent reputation among physicians but little experience in over thecounter drugs so that Demtech's competitive advantage is with the antibiotic. Should Demtech choose to market the cold remedy, it believes that its sales will increase if Donovan also enters the cold remedy market and advertises heavily. Similarly, Donovan anticipates that its sales in the antibiotic market would be enhanced if Demtech produces antibiotics, given Demtech's excellent reputation among physicians. In short, each firm believes that there are circumstances under which participation by the other firm will complement rather than compete with the firm's own sales. Profits in millions of dollars are given in the payoff matrix below.

		Demtech	
		Cold Remedy	Antibiotic
Donovan	Cold Remedy	60, 80	100, 70
	Antibiotic	30, 65	40, 50

a. Given the table above, does either firm have a dominant strategy? Is there a Nash equilibrium? (Explain the difference between a Nash equilibrium and a dominant strategy.)
b. Pharmaceutical firms within the EU are attempting to organize a risk pool that would share liability risks for new drugs. Since Donovan and Demtech are among the largest pharmaceutical companies operating in Europe, the benefits of the risk pool depend upon the participation of the other firm. Increased profits achieved through reduced risk liability (measured in millions of dollars) are shown in the payoff matrix below.

		Demtech	
		Participate	Don't Participate
Donovan	Participate	0, 0	0, 3
	Don't Participate	3, 0	15, 15

Does either firm have an incentive to use participation in the risk pool as a bargaining device in the drug–marketing decision? If so, what would be the nature of the bargain? How credible is the firm's bargaining position? What could be done to make the bargaining position more credible?

Answer: ***a.***

Demtech has a dominant strategy in the cold preparation since Demtech is better off producing the cold remedy regardless of Donovan's choice. The Nash equilibrium is for both firms to produce the cold remedy. We can deduce this from Demtech's dominant strategy. Given that Demtech will produce the cold remedy, Donovan should also produce the cold remedy. (Donovan's dominant strategy is also to produce the cold remedy.)

Dominant Strategy: A strategy that is optimal regardless of rival's strategy. Nash equilibrium: A strategy that a player believes is optimal, given the rival strategy.

b.

Donovan should bargain to tie participation in the risk pool to a commitment from Demtech to produce the antibiotic. Donovan's position is fairly credible because they gain more profit if Demtech agrees (40 million) than they lose (15 million at most) by refusing to participate in the pool. Donovan can make their position more credible by making their intentions public and by always sticking to this strategy.

Diff: 2
Section: 13.3

118) The widget market is controlled by two firms: Acme Widget Company and Widgetway Manufacturing. The structure of the market makes secret price cutting impossible. Each firm announces a price at the beginning of the time period and sells widgets at the price for the duration of the period. There is very little brand loyalty among widget buyers so that each firm's demand is highly elastic. Each firm's prices are thus very sensitive to inter–firm price differentials. The two firms must choose between a high and low price strategy for the coming period. Profits (measured in thousands of dollars) for the two firms under each price strategy are given in the payoff matrix below. Widgetway's profit is before the comma, Acme's is after the comma.

		Acme	
		Low Price	High Price
Widgetway	Low Price	60, 60	250, -20
	High Price	-20, 250	130, 130

a. Does either firm have a dominant strategy? What strategy should each firm follow?
b. Assume that the game is to be played an infinite number of times. (Or, equivalently, imagine that neither firm knows for certain when rounds of the game will end, so there is always a positive chance that another round is to be played after the present one.) Would the tit–for–tat strategy would be a reasonable choice? Explain this strategy.
c. Assume that the game is to be played a very large (but finite) number of times. What is the appropriate strategy if both firms are always rational?

Answer: ***a.***

Each firm's dominant strategy is the low price. This follows from the realization that each player is better off with the low price strategy regardless of the opponent's strategy.

b.

With an infinite number of trials, a tit–for–tat strategy is appropriate. Under tit–for–tat, each player chooses the high price so long as his rival cooperates by also choosing the high price. Once the rival cuts prices, the other player retaliates. If the rival raises price back to the high price, the firm follows suit.

c.

A finite number of periods implies a low price for every period. The process begins when each player realizes its opponent cannot retaliate after the last period so that the low price is rational for the last period. This in turn makes the low price rational for the next to last period and so on.

Diff: 2
Section: 13.4

119) Mitchell Electronics produces a home video game that has become very popular with children. Mitchell's managers have reason to believe that Wright Televideo Company is considering entering the market with a competing product. Mitchell must decide whether to set a high price to accommodate entry or a low, entry–deterring price. The payoff matrix below shows the profit outcome for each company under the alternative price and entry strategies. Mitchell's profit is entered before the comma, and Wright's is after the comma.

		Wright Televideo	
		Enter	Don't Enter
Mitchell Electronics	High Price	60, 25	85, 0
	Low Price	30, -20	60, 0

a. Does Mitchell have a dominant strategy? Explain.
b. Does Wright have a dominant strategy? Explain.
c. Mitchell's managers have vaguely suggested a willingness to lower price in order to deter entry. Is this threat credible in light of the payoff matrix above?
d. If the threat is not credible, what changes in the payoff matrix would be necessary to make the threat credible? What business strategies could Mitchell use to alter the payoff matrix so that the threat is credible?

Answer: ***a.***
Mitchell's dominant strategy is the high price. Regardless of Wright's decision to enter, Mitchell earns a larger profit with a high price.

b.
Wright does not have a dominant strategy. Wright's best choice depends upon the decision made by Mitchell. When Mitchell sets a high price, Wright should enter, whereas a low Mitchell price leads to no entry.

c.
Mitchell's threat is not credible. It is obvious that Mitchell's best strategy is to set a high price, regardless of the decision Wright makes regarding entry.

d.
To make the threat credible, Mitchell's best strategy must be the low price, at least for the case where Wright enters. A possible business strategy would be for Mitchell to expand capacity, increasing the profit maximizing quantity.

Diff: 2
Section: 13.6

120) The countries Economus and Sociolomous on planet Subjectus are engaged in a Cold War. The pay–offs of their available strategies are presented in the table below.

		Sociolomous	
		Halt Arms Build-up	Continue Arms Build-up
Economus	Halt Arms Build up	10,10	-50,50
	Continue Arms Build-up	50,-50	-10,-10

The pay–offs are listed in terms of percentage growth in the standard of living of the two countries.
Does either country have a dominant strategy? Does the game have a Nash equilibrium? What is the maximin strategy of each player in the game?

Answer: Both countries can do better by continuing the Arms Build–up regardless of what their competitor chooses. Thus, both countries have a dominant strategy to continue the Arms Build–up. In the Nash equilibrium both countries choose the "Continue Arms Build–up" strategy. The maximin strategy will allow the players to avoid losing 50 percent growth in standard of living. Under the maximin strategy, the players also choose the Continue Arms Build–up Strategy.

Diff: 1
Section: 13.6

121) Megan and Amanda are both 7 years old and operate lemonade stands. Megan lives on the east side of Welch Avenue while Amanda resides on the west side of Welch Avenue. Each morning, the girls must decide whether to place their stand on Welch Avenue or Lincoln Avenue. When they set their stand–up, they don't know what the other will do and can't relocate. If both girls put their stand on Welch, both girls receive $175 in profits. If both girls put their stand on Lincoln, they each receive $75 in profits. If one girl sets their stand on Welch while the other operates on Lincoln, the stand on Welch earns $300 in profits while the stand on Lincoln earns $225. Diagram the relevant pay–off matrix. Does either girl have a dominant strategy? Does the game have a Nash equilibrium? What is the maximin strategy of each player in the game?

Answer: Neither player has a dominant strategy in this game. There are two Nash equilibria in this game. The first Nash equilibrium is where Megan places her stand on Welch while Amanda places her stand on Lincoln. The second Nash equilibrium occurs where Megan places her stand on Lincoln while Amanda places her stand on Welch. The maximin strategy for both players will be to avoid the $75 pay–off. To do this, the player will never choose to locate on Lincoln. If both players do this, the result will be for both players to locate on Welch.

		Megan	
		Welch	Lincoln
Amanda	Welch	175,175	300,225
	Lincoln	225,300	75,75

Diff: 2
Section: 13.6

122) Dale and Terry are racing automobiles around a track. Currently, Terry is in the lead. However, Dale has a faster car and is just behind Terry. The racers' strategies and pay–offs are presented in the table below.

		Dale	
		Attempt Pass on Inside	Attempt Pass on Outside
Terry	Block Inside	Win, Lose	Lose, Win
	Block Outside	Lose, Win	Win, Lose

Does either player have a dominant strategy? Does the game have a Nash equilibrium? What is the maximin strategy of each player in the game?

Answer: Neither player has a dominant strategy, and there is no Nash equilibrium in this game. Also, there is no strategy the players can choose to prevent the worst outcome, so there is no maximin strategy.

Diff: 1
Section: 13.6

123) Dale and Terry are racing automobiles around a track. Currently, Terry is in the lead. However, Dale has a faster car and is just behind Terry. The racers' strategies and pay–offs are presented in the table below. The goal of the drivers is to do as well as possible in the race. There are a total of 43 cars on the track.

		Dale		
		Attempt Pass on Inside	Attempt Pass on Outside	Do Nothing
Terry	Block Inside	#42,#43	#2, #1	#1, #2
	Do Nothing	#2, #1	#2, #1	#1, #2
	Block Outside	#2, #1	#42, #43	#1, #2

Does either player have a dominant strategy? Does the game have a Nash equilibrium? What is the maximin strategy of each player in the game?

Answer: Neither player has a dominant strategy, and there is no Nash equilibrium in this game. Each player can play the "Do Nothing" strategy to avoid a finish out of the top 2. Thus, the "Do Nothing" strategy is the maximin strategy for both players.

Diff: 2
Section: 13.6

124) Tony and Larry are managers of baseball teams that currently playing a game. It's late in the ballgame and Tony's team is currently winning and in the field. Tony's strategies are to bring in a right handed pitcher (RHP) or to bring in a left handed pitcher (LHP). Larry's strategies are to bring in a right handed pinch hitter (RPH) or to bring in a left handed pinch hitter (LPH). The pay–off matrix is in terms of winning (W) or losing (L) the game. Does either player have a dominant strategy? Does the game have a Nash equilibrium? What is the maximin strategy of each player in the game?

		Larry	
		LPH	RPH
Tony	LHP	W, L	L , W
	RHP	L, W	W, L

Answer: Neither player has a dominant strategy in this game, and there is no Nash equilibrium. Neither player has a maximin strategy available as they cannot avoid a chance at losing.

Diff: 2
Section: 13.6

125) Casey's General Store is considering placing a store in Hamilton, Missouri. If they place the store in Hamilton and no other convenience store enters the Hamilton market, they'll earn profits of $100,000 per year. If competitors do enter, Casey's profits as well as the competitor's profits will be reduced to $0 per year. If a competitor enters the Hamilton market and Casey's does not, the competitor's profits will be $100,000 per year.

		Competitor	
		ENTER	DO NOT ENTER
Casey's	ENTER	$0; $0	$100,000; $0
	DO NOT ENTER	$0; $100,000	$0; $0

Does either player have a dominant strategy? Does the game have any Nash equilibria? What is the maximin strategy of each player in the game?

Answer: Both players can do at least as well or better by playing the "ENTER" option regardless of what their competitor does. This implies both players have a dominant strategy of "ENTER." The dominant strategy equilibrium is for both players to play "ENTER." This is not the only Nash equilibrium. This game has three Nash equilibria. The only cell that is not a Nash equilibrium is the cell corresponding to both players playing the "DO NOT ENTER" strategy. Given Casey's will not enter the market, the Competitor's best strategy is to enter the market (and vice versa). For both players, neither strategy offers a path to maximize the minimum gain as the minimum gain is equivalent for all strategies.

Diff: 2
Section: 13.6

126) Gym X and Bodyworks are both going to open an exercise facility in the local market. Each company may decide to open a facility concentrating on cardio equipment for customers interested in mostly aerobic workouts. Another alternative for each company is to open a facility concentrating on muscle building equipment for customers interested mostly in bodybuilding workouts. The pay–off matrix for each company dependent upon their strategies and that of their competitor is given below.

		Bodyworks	
		Cardio	Muscle Building
Gym X	Cardio	$-10,000; $-10,000	$100,000; $125,000
	Muscle Building	$125,000; $100,000	$-15,000; $-15,000

Does either player have a dominant strategy? Does the game have any Nash equilibria? What is the maximin strategy of each player in the game?

Answer: Neither player has a dominant strategy in this game. There are two Nash equilibria. A Nash equilibrium corresponds to Gym X choosing the "Cardio" strategy while Bodyworks chooses the "Muscle Building" strategy. Another Nash equilibrium corresponds to Bodyworks choosing the "Cardio" strategy while Gym X chooses the "Muscle Building" strategy. Each player's maximin strategy would be to avoid the –$15,000 outcome. Thus, the maximin strategy is for each player to choose the "Cardio" strategy.

Diff: 2
Section: 13.6

127) Two firms in a local market compete in the manufacture of cyberwidgets. Each firm must decide if they will engage in product research to innovate their version of the cyberwidget. The pay–offs of each firm's strategy is a function of the strategy of their competitor as well. The pay–off matrix is presented below.

		Firm #2	
		INNOVATE	DO NOT INNOVATE
Firm #1	INNOVATE	$-10; $-10	$1,000; $50
	DO NOT INNOVATE	$50; $1,000	$15; $15

Does either player have a dominant strategy? Does the game have any Nash equilibria? What is the maximin strategy of each player in the game?

Answer: Neither player has a dominant strategy in this game. There are two Nash equilibria in this game. One Nash equilibrium is for Firm #1 to Innovate their product while Firm #2 does not. A second Nash equilibrium is for Firm #2 to innovate their product while Firm #1 does not. Each player's maximin strategy is to choose the "DO NOT INNOVATE" option.

Diff: 2
Section: 13.6

128) A small regional airline is considering offering service to the Big City market. A large carrier already provides service to Big City. The small carrier's two strategies are: Enter Market or Do Not Enter. The large carrier's strategies are: Price Dump or Maximize Profits in the Short Run. By price dumping in the Big City market, the large carrier can force the small carrier out of business and make monopoly profits in the long–run. The long–run pay–offs are presented in the pay–off matrix below.

		Small	
		ENTER	DO NOT ENTER
Large	PRICE DUMP	$1,000,000; $-300,000	$1,350,000; $0
	SHORT RUN PROFIT MAX.	$250,000; $100,000	$2,000,000; $0

Does either player have a dominant strategy? Does the game have any Nash equilibria? What is the maximin strategy of each player in the game?

Answer: Neither player has a dominant strategy in this game. Also, there is no Nash equilibrium in the game. The small carrier's maximin strategy is to choose the "DO NOT ENTER" option. The large carrier's maximin strategy is to choose the "PRICE DUMP" strategy.

Diff: 1
Section: 13.6

129) Joanna has a credit card account with Card Bank. Card Bank's available strategies are to raise Joanna's credit card interest rate or do nothing. Joanna's available strategies are to transfer her Card Bank account balance to another creditor or do nothing. The strategy pay–offs are indicated below.

		Joanna	
		Transfer	Do Nothing
Card Bank	Raise Interest Rate	$-300; $-100	$1,000; $-1,000
	Do Nothing	$-300; $-150	$0; $0

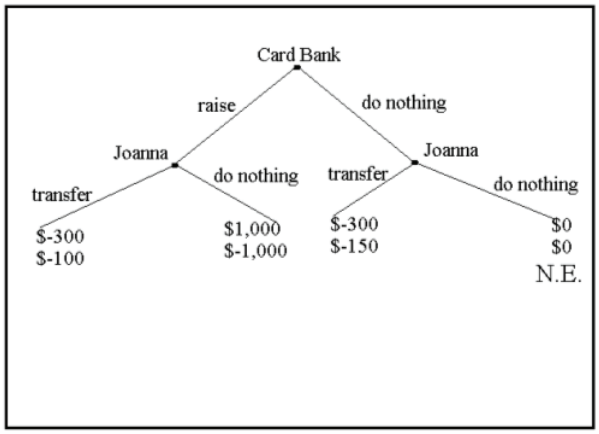
Does either player have a dominant strategy? Does the game have any Nash equilibria? What is the maximin strategy of each player in the game?

Answer: Card Bank can always do at least as well or better by choosing the "Raise" strategy. This implies that Card Bank's dominant strategy is to raise Joanna's interest rate. Joanna does not have a dominant strategy. The Nash equilibrium in this game corresponds to Joanna transferring her balance to another creditor while Card Bank raises Joanna's interest rate. Joanna's maximin strategy is to Transfer to another creditor. Card Bank has no maximin strategy as the bank cannot avoid the –$300 outcome by choosing a particular strategy.

Diff: 2
Section: 13.6

130) Joanna has a credit card account with Card Bank. Card Bank's available strategies are tp raise Joanna's credit card interest rate or do nothing. Joanna's available strategies are to transfer her Card Bank account balance to another creditor or do nothing. If Card Bank raises Joanna's interest rate and Joanna does nothing, Card Bank increases profits by $1,000 while Joanna receives –$1,000. If Card Bank raises Joanna's interest rate and Joanna transfers her account to another creditor, Card Bank receives –$300 while Joanna receives –$100. If Card Bank does nothing and Joanna does nothing, each player receives $0. If Card Bank does nothing and Joanna transfers her account to another creditor, Card Bank receives –$300 while Joanna receives –$150. Diagram the game tree for this sequential game. Indicate any Nash equilibria.

Answer: The Nash equilibrium is for both players to choose the "Do Nothing" strategy. The game tree is indicated below.



Diff: 2
Section: 13.6

131) Two firms in a local market compete in the manufacture of cyberwidgets. Each firm must decide if they will engage in product research to innovate their version of the cyberwidget. The pay–offs of each firm's strategy is a function of the strategy of their competitor as well. The pay–off matrix is presented below.

		Firm #2	
		INNOVATE	DO NOT INNOVATE
Firm #1	INNOVATE	\$-10; \$-10	\$100; \$-5
	DO NOT INNOVATE	\$-5; \$100	\$0; \$0

Firm #2 chooses to innovate with probability 20/21. If Firm #1 does the same, what is the expected pay–off? Is this a Mixed Strategy Nash Equilibrium? Suppose, instead, that firm #2 innovates with probability 2/3. Should player #1 always innovate?

Answer: If firm #1 does the same, the expected pay–offs for both firms are zero. This is a Mixed Strategy Nash Equilibrium. If Firm #2 chooses to innovate with probability 2/3, Firm #1 should always innovate. This is because the expected profits are as high as possible when firm #1 sets the probability of choosing to innovate equal to 1.

Diff: 2
Section: 13.6

132) Two firms in a local market compete in the manufacture of cyberwidgets. Each firm must decide if they will offer a warranty or not. The pay–offs of each firm's strategy is a function of their competitor as well. The pay–off matrix is presented below.

		Firm #2	
		Offer Warranty	No Warranty
Firm #1	Offer Warranty	\$-5; \$-5	\$10; \$-10
	No Warranty	\$-10; \$10	\$0; \$0

Does either player have a dominant strategy? Does the game have any Nash equilibria? What is the maximin strategy of each player in the game? Should the players use a mixed strategy?

Answer: Both players have a dominant strategy to offer a warranty on their cyberwidgets. This implies the game has a dominant strategy equilibrium of both firms offering a warranty. This is also the only Nash equilibrium in the game. Each player's maximin strategy is to avoid the –\$10 outcome. To avoid this outcome, both player's maximin strategy is to "Offer Warranty." The players do best by choosing to Offer a Warranty regardless of what their opponent does. Thus, the optimal mixed strategy is to set the probability of offering a warranty equal to one.

Diff: 2
Section: 13.6

133) Two firms in a local market compete in the manufacture of cyberwidgets. Each firm must decide if they will offer a warranty or not. The pay–offs of each firm's strategy is a function of their competitor as well. The pay–off matrix is presented below.

		Firm #2	
		Offer Warranty	No Warranty
Firm #1	Offer Warranty	\$8; \$3	\$2; \$2
	No Warranty	\$6; \$0	\$6; \$12

If firm #1 announces it will offer a warranty regardless of what firm #2 does, is this a credible threat? Why or why not?

Answer: Both firms offering a warranty and both firms offering no warranty are both Nash Equilibria for this game. Firm #1 prefers the Nash Equilibrium corresponding to both firms offering a warranty on their cyberwidgets. Firm #1's announcement is a credible threat. Firm #1 actually can always do at least as well or better by offering a warranty. Thus, firm #1's dominant strategy is to offer a warranty.

Diff: 2
Section: 13.6

134) Two firms in a local market compete in the manufacture of cyberwidgets. Each firm must decide if it will offer a warranty or not. The pay–offs of each firm's strategy is a function of their competitor as well. The pay–off matrix is presented below.

		Firm #2	
		Offer Warranty	No Warranty
Firm #1	Offer Warranty	\$8; \$3	\$2; \$2
	No Warranty	\$4; \$0	\$6; \$12

If firm #1 announces they will offer a warranty regardless of what firm #2 does, is this a credible threat? Why or why not?

Answer: Both firms offering a warranty and both firms offering no warranty are both Nash Equilibria for this game. Firm #1 prefers the Nash Equilibrium corresponding to both firms offering a warranty on their cyberwidgets. Firm #1's announcement is not a credible threat. Firm #1 actually can do better by not offering a warranty given firm #2 does not offer a warranty. Thus, it is in firm #1's best interest to not offer a warranty if firm #2 does not offer a warranty regardless of firm #1's announcement.

Diff: 3
Section: 13.6

Chapter 14 Markets for Factor Inputs

1) A firm should hire more labor when the marginal revenue product of labor
   A) equals the wage rate.
   B) exceeds the wage rate.
   C) is less than the wage rate.
   D) Any of these can be true.
   E) None of these are true.

Answer: B
Diff: 1
Section: 14.1

2) The marginal revenue product of labor is equal to
   A) MP_L P.
   B) MP_L / P.
   C) MP_L * MR.
   D) MP_L / MR
   E) MR / MP_L

Answer: C
Diff: 1
Section: 14.1

3) The marginal revenue product can be expressed as the
   A) additional revenue received from selling one more unit of product.
   B) increment to revenue received from one additional unit of input hired.
   C) marginal physical product of an input times the average revenue received from the sale of the product.
   D) average physical product of the input times the marginal revenue received from the sale of the final product.

Answer: B
Diff: 1
Section: 14.1

4) Other things being equal, the marginal revenue product (MRP) curve for a competitive seller
   A) lies below the MRP curve for a monopolist.
   B) is identical to the MRP curve for a monopolist.
   C) lies above the MRP curve for a monopolist.
   D) is upward sloping whereas a monopolist has a downward sloping MRP curve.

Answer: C
Diff: 1
Section: 14.1

5) What can account for the negative slope of the marginal revenue product curve?
A) Diminishing marginal utility
B) Diminishing marginal returns
C) Monopsony power
D) All workers eventually begin slacking.
E) none of the above

Answer: B
Diff: 1
Section: 14.1

6) In the competitive output market for good Q, the marginal revenue product for an input X can be expressed as
A) MP_X / TR_Q. B) $MP_Q MR_X$. C) $AP_X MR_Q$. D) $MP_X * P_Q$

Answer: D
Diff: 1
Section: 14.1

7) If the market for labor is perfectly competitive, the profit maximizing level of labor occurs where
A) $MRP_L < W$ (the wage).
B) $MRP_L = P$ (the output price).
C) MRP_L just exceeds W.
D) $MRP_L = W$.
E) none of the above

Answer: D
Diff: 1
Section: 14.1

Scenario 14.1:
You are the manager of a firm producing green chalk. The marginal product of labor is:

$$MP_L = 24L^{-1/2}$$

Suppose that the firm is a competitor in the green chalk market. The price of green chalk is $1 per unit. Further suppose that the firm is a competitor in the labor market. The wage rate is $12.00 per hour.

8) Given the information in Scenario 14.1, what is the marginal revenue product of labor?
A) $0.5L^{-1/2}$ B) $2L^{-1/2}$ C) $12L^{-1/2}$ D) $24L^{-1/2}$

Answer: D
Diff: 1
Section: 14.1

9) Given the information in Scenario 14.1, how much labor will be hired to maximize profit?
A) 1/16 B) 1/2 C) 1 D) 4

Answer: D
Diff: 2
Section: 14.1

10) If leisure is a normal good, then the income effect of a decrease in wage will
A) decrease the number of hours worked.
B) increase the number of hours worked.
C) decrease the number of leisure hours.
D) increase the sum of leisure plus hours worked.

Answer: B
Diff: 1
Section: 14.1

11) The substitution effect of a decrease in the wage will
A) decrease leisure, regardless of whether leisure is a normal or inferior good.
B) increase leisure, regardless of whether leisure is a normal or inferior good.
C) increase leisure only if leisure is a normal good.
D) decrease leisure only if leisure is a normal good.

Answer: B
Diff: 1
Section: 14.1

12) If an individual's labor supply curve is backward bending, then
A) the income effect associated with a higher wage is greater than the substitution effect.
B) the substitution effect associated with a higher wage is greater than the income effect.
C) the substitution effect associated with a higher wage encourages more leisure.
D) A and C
E) B and C

Answer: A
Diff: 2
Section: 14.1

Scenario 14.2:
A firm can hire labor at the minimum wage of $4.25 per hour. Assume that labor works 8 hours a day. The firm's production function is as follows:

Number of Days of Labor	Number of Units of Output
0	0
1	8
2	15
3	21
4	26
5	30

13) Refer to Scenario 14.2. If each unit of output sells for $5, how many days of labor will the firm hire to maximize profit?
A) 1 B) 2 C) 3 D) 4 E) 5

Answer: B
Diff: 2
Section: 14.1

14) Refer to Scenario 14.2. What is the marginal revenue product of the 4th worker?
A) 20 B) 25 C) 30 D) 32.5 E) 35

Answer: B
Diff: 2
Section: 14.1

15) Refer to Scenario 14.2. What is the average product of the 4th worker?
A) 4 B) 5 C) 6 D) 6.5 E) 7

Answer: D
Diff: 2
Section: 14.1

16) Assume that labor and capital are complements in production and that the wage declines. Which of the following statements best describes the adjustment in the use of labor?
A) Adjustments in labor use are not influenced by adjustments in capital use.
B) The MRP_L curve shifts downward in this case.
C) More labor is used both because of the reduced wage and increased use of capital.
D) Changes in labor use are indeterminate because the reduced wage and reduced use of capital have opposite influences on the use of labor.

Answer: C
Diff: 2
Section: 14.1

17) When compared to the demand curve for only one variable input, the demand curve for a factor input when several inputs are variable is
A) less elastic. B) more elastic. C) vertical. D) horizontal.

Answer: B
Diff: 2
Section: 14.1

18) If only one firm in an industry could take advantage of a reduced wage and all other firms continue paying the old wage, how would one best describe the one firm's reaction to this reduced wage assuming labor is the only variable input? The marginal revenue product of labor curve
A) would remain unchanged, and the firm would hire more labor at the lower wage.
B) shifts to the left, and the firm hires more labor at the lower wage on the new curve.
C) shifts to the right, and the firm hires more labor at the lower wage on the new curve.
D) shifts to the left, and the firm hires less labor at the lower wage on the new curve.
E) shifts to the right, and the firm hires less labor at the lower wage on the new curve.

Answer: A
Diff: 2
Section: 14.1

19) An increase in technology that enhances labor productivity will likely result in:
A) a decrease in labor employment and an increase in the wage rate.
B) an increase in labor employment and an increase in the wage rate.
C) a decrease in labor employment and a decrease in the wage rate.
D) an increase in labor employment and a decrease in the wage rate.
E) employers using less labor and more capital while the wage effect is unknown.

Answer: B
Diff: 2
Section: 14.1

20) When the factor market is purely competitive, the firm's average expenditure curve for a factor of production is
A) upward sloping and to the right of the marginal expenditure curve.
B) downward sloping and to the right of the marginal expenditure curve.
C) identical to the marginal expenditure curve.
D) downward sloping and to the left of the marginal expenditure curve.

Answer: C
Diff: 2
Section: 14.1

21) Under what circumstances are the marginal expenditure for an input and the average expenditure always equal? Where there is a
A) competitive buyer.
B) competitive seller.
C) monopoly buyer.
D) monopoly seller.

Answer: A
Diff: 2
Section: 14.1

22) A firm purchases a factor of production in a competitive market. At the current purchase rate the MRP of the factor is greater than the marginal expenditure for the factor. Thus, the firm
A) can increase profit by reducing the employment of the factor of production.
B) is now maximizing profit.
C) should not use this factor of production because it has no potential in generating a profit.
D) can increase profit by expanding the employment of the factor of production.

Answer: D
Diff: 2
Section: 14.1

23) Assume that as the wage rate rises a worker's substitution effect for leisure is larger than the income effect. We can conclude that in this region, the worker's
A) labor supply curve will be backward bending.
B) labor supply curve will have the usual upward slope.
C) labor supply curve will be completely inelastic.
D) supply curve will be horizontal.

Answer: B
Diff: 2
Section: 14.1

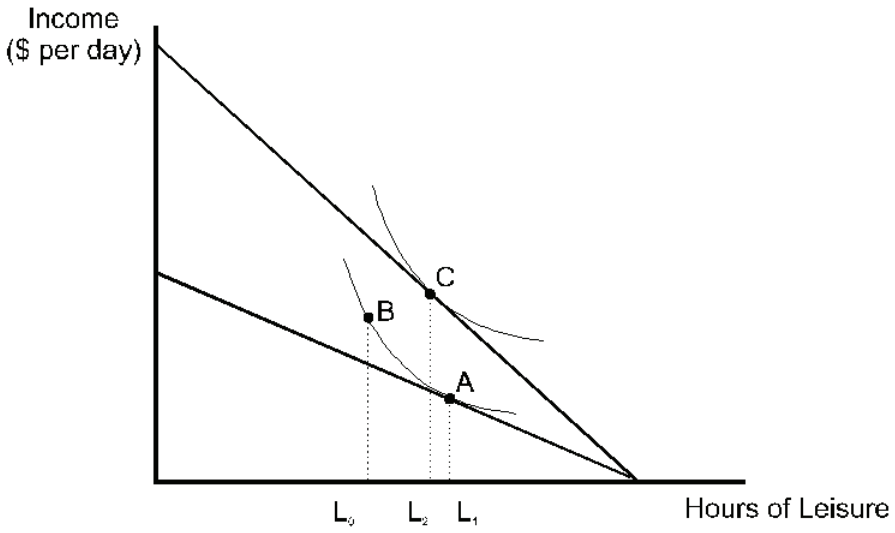


Figure 14.1

A consumer's original utility maximizing combination of income and leisure is shown in the diagram above as point A. After a wage increase, the consumer's utility maximizing combination changes to point C.

24) Refer to Figure 14.1. The substitution effect of the wage increase on the amount of hours of leisure is:
A) L_1 to L_0
B) L_1 to L_2.
C) L_0 to L_2.
D) L_0 to L_1.
E) none of the above

Answer: A
Diff: 2
Section: 14.1

25) Refer to Figure 14.1. The income effect of the wage increase on the amount of hours of leisure is:
A) L_0 to L_2.
B) L_0 to L_1.
C) L_1 to L_2.
D) L_2 to L_1.
E) none of the above

Answer: A
Diff: 2
Section: 14.1

26) The industry demand curve for labor is the
A) horizontal sum of individual firm labor demand curves.
B) vertical sum of individual firm demand curves.
C) representative firm's demand curve multiplied by the number of firms.
D) none of the above

Answer: A
Diff: 2
Section: 14.1

27) If the firms in an industry could take advantage of a reduced wage, how would one best describe the firms' demand for labor? The MRP_L
A) schedule would remain unchanged, and the firms would hire more labor at the lower wage.
B) schedule would shift to the left and the firms would move down the new schedule.
C) schedule would shift to the right and the firms would move down the new schedule.
D) none of the above

Answer: A
Diff: 2
Section: 14.1

28) The marginal product of labor for Acme, Inc. is 15. The average product of labor is 25, and the price of labor is $10. Assuming that Acme, Inc. is a competitor in its output and input markets, the marginal revenue product of labor:
A) is $10.
B) is $150.
C) is $250.
D) is $375.
E) cannot be determined with the information provided.

Answer: E
Diff: 2
Section: 14.1

29) The Acme Company is a perfect competitor in its input markets and its output market. Its average product of labor is 30, the marginal product of labor is 20, the price of labor is $20, and the price of the output is $5. For Acme Company, the marginal revenue product of labor
A) is $100.
B) is $150.
C) is $400.
D) is $600.
E) cannot be determined with the information provided.

Answer: A
Diff: 2
Section: 14.1

30) The Acme Company is a perfect competitor in its input markets and a monopolist in its output market. Its average product of labor is 30, the marginal product of labor is 20, the price of labor is $20, and the price of the output is $5. For Acme Company, the marginal revenue product of labor
A) is $100.
B) is $150.
C) is $400.
D) is $600.
E) cannot be determined with the information provided.

Answer: E
Diff: 2
Section: 14.1

31) The Acme Company is a perfect competitor in its input markets and a monopolist in its output market. The marginal product of labor is 20 and the price of Acme's output is $10. For Acme Company, the marginal revenue product of labor is
A) less than $10.
B) $10.
C) $20.
D) less than $200.
E) $200

Answer: D
Diff: 2
Section: 14.1

32) The Acme Company is a perfect competitor in its input markets and its output market. Its average product of labor is at its maximum and equals 30. The marginal revenue product of labor is $300. The price of its output
A) is $0.10.
B) is $10.
C) is $9,000.
D) cannot be determined without more information.

Answer: B
Diff: 3
Section: 14.1

Scenario 14.3:
Suppose that a firm's demand curve for its product is as follows:

Output	Price of the Good
25	9
40	8
54	7
67	6
79	5
90	4

Also suppose that labor is the only variable input of production, and that the total product of labor is:

Amount of Labor	Total Output
2	25
3	40
4	54
5	67
6	79
7	90

33) Given the data in Scenario 14.3, how much labor should the firm employ if labor costs $30 a unit?
A) 3 units of labor
B) 4 units of labor
C) 5 units of labor
D) 6 units of labor
E) 7 units of labor

Answer: B
Diff: 3
Section: 14.1

34) Refer to Scenario 14.3. What is the marginal profit from hiring the third unit of labor?
A) 30
B) 65
C) 85
D) 225
E) none of the above

Answer: B
Diff: 3
Section: 14.1

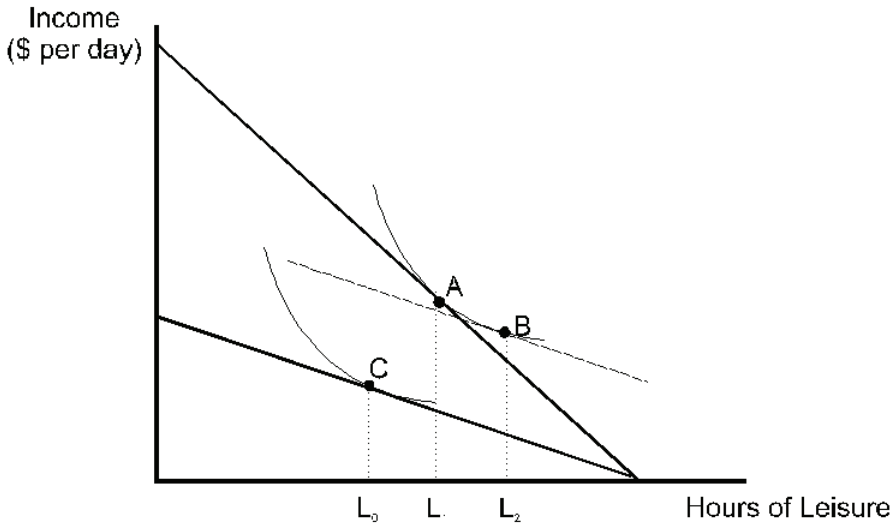


Figure 14.2

A consumer's original utility maximizing combination of income and leisure is shown in the diagram above as point A. After a wage decrease, the consumer's utility maximizing combination changes to point C.

35) Refer to Figure 14.2. The substitution effect of the wage decrease on the amount of hours of leisure is:
A) L_1 to L_0.
B) L_0 to L_1.
C) L_1 to L_2.
D) L_2 to L_0.
E) none of the above

Answer: C
Diff: 3
Section: 14.1

36) Refer to Figure 14.2. The income effect of the wage decrease on the amount of hours of leisure is:
A) L_0 to L_1.
B) L_0 to L_2.
C) L_1 to L_2.
D) L_2 to L_1.
E) none of the above

Answer: E
Diff: 3
Section: 14.1

37) Suppose a firm has one variable input, labor. Why is the MRP_L curve for a competitive firm above the MRP_L curve for a monopolist?

A) Without competition from other firms, monopolies are less efficient and the marginal product of labor is lower at each level of output.
B) Although the marginal product of labor may be the same under both market structures, the marginal revenue of the monopoly declines with output.
C) Monopolists have less incentive to invest in worker training and other methods for improving labor productivity, so the marginal product of labor is lower in the monopoly case.
D) none of the above

Answer: B
Diff: 2
Section: 14.1

38) Use the following statements to answer this question:

I. Under profit maximization, the quantity of labor used in production is optimal if MR = w/MP_L.

II. The expression MR = w/MPL implies that the revenue earned from the last unit of output produced equals the marginal cost of the last unit of output.

A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: A
Diff: 1
Section: 14.1

39) Suppose labor and capital are variable inputs. The wage rate is $20 per hour, the marginal product of labor is 30 units, the rental rate of capital is $100 per machine hour, and the marginal product of capital is 150 units. If the wage rate declines to $15 per hour, the firm employs more labor and the marginal product of labor declines to 20 units. Assuming the rental rate of capital remains the same, what happens to the amount of capital used by the firm?

A) Decreases
B) Increases
C) No change
D) We do not have enough information to answer this question.

Answer: B
Diff: 2
Section: 14.1

40) Suppose labor and capital are variable inputs. The wage rate is $20 per hour, the marginal product of labor is 30 units, the rental rate of capital is $100 per machine hour, and the marginal product of capital is 150 units. If the wage rate declines to $15 per hour, the firm employs more labor and the marginal product of labor declines to 20 units. Assuming the rental rate of capital remains the same, what is the marginal product of capital at the new optimal level of input usage?
A) 100 units
B) 133 units
C) 150 units
D) We do not have enough information to answer this question.

Answer: B
Diff: 1
Section: 14.1

41) Let P be the output price for a particular good. Why is the value $P*MP_L$ greater than MRP_L for a monopolist?
A) The monopolist is not as technically efficient as firms operating under perfect competition.
B) The monopolist hires less labor, so MP_L is higher under a monopoly than under perfect competition.
C) The monopolist sets a price that is higher than MR.
D) A and C are correct.
E) B and C are correct.

Answer: E
Diff: 2
Section: 14.1

42) Which of the following is NOT true about the supply of labor to the firm in a competitive labor market?
A) It is horizontal.
B) It is perfectly elastic.
C) It is equal to the marginal expenditure curve.
D) It is upward sloping.

Answer: D
Diff: 1
Section: 14.2

43) In a competitive labor market, with one variable factor, the supply of labor to the firm is
A) equal to the marginal expenditure curve.
B) equal to the demand curve for labor.
C) greater than the marginal expenditure curve.
D) equal to the marginal revenue product curve.

Answer: A
Diff: 1
Section: 14.2

44) What happens to the marginal revenue product curve of a factor as more of a complementary factor is hired?
A) It shifts to the left, because its marginal product decreases.
B) It shifts to the left, because its marginal product increases.
C) It shifts to the right, because its marginal product decreases.
D) It shifts to the right, because its marginal product increases.

Answer: D
Diff: 1
Section: 14.2

45) Under what circumstances will the economic rent earned by a factor of production always be zero?
A) Infinitely inelastic supply curve
B) Infinitely elastic supply curve
C) Somewhat inelastic supply curve
D) Elastic demand curve

Answer: B
Diff: 2
Section: 14.2

46) Suppose a competitive industry produces output, Q, using some input, i, where the price of the output is P_Q and the input price is P_i. Efficient use of resources requires that
A) $MRP_i = MP_i$.
B) $MRP_i = Mp_i/P_Q$.
C) $MRP_i = MP_i P_Q$.
D) $MRP_i = P_i$.

Answer: D
Diff: 2
Section: 14.2

47) Suppose the labor market is perfectly competitive, but the output market is not. When the labor market is in equilibrium, the wage rate will:
A) be less than the marginal revenue product of labor.
B) equal the marginal revenue product of labor.
C) be greater than the marginal revenue product of labor.
D) None of the above is necessarily correct.

Answer: B
Diff: 2
Section: 14.2

48) Suppose the labor market is perfectly competitive, but the output market is not. When the labor market is in equilibrium, the wage rate will:
A) be less than price times the marginal product of labor.
B) equal price times the marginal product of labor.
C) be greater than price times the marginal product of labor.
D) None of the above is necessarily correct.

Answer: A
Diff: 2
Section: 14.2

49) Suppose the labor market and all output markets are perfectly competitive. When the labor market is in equilibrium, the wage rate will:
A) be less than the marginal revenue product of labor.
B) equal the marginal revenue product of labor.
C) be greater than the marginal revenue product of labor.
D) None of the above is necessarily correct.

Answer: B
Diff: 2
Section: 14.2

50) All of the payment to a factor of production will be economic rent when the factor of production has:
A) an infinitely inelastic supply curve.
B) an infinitely elastic supply curve.
C) a constant, unit elastic supply curve.
D) an infinitely inelastic demand curve.

Answer: A
Diff: 2
Section: 14.2

51) Under an upward sloping supply curve for land, the economic rents to land _____ as the demand for land shifts rightward.
A) decrease
B) increase
C) remain the same
D) We do not have enough information to answer this question.

Answer: B
Diff: 2
Section: 14.2

52) Under an infinitely inelastic supply of land, the economic rents to land _____ if the price of land doubles.
A) increase by less than 100%
B) double
C) increase by more than 100%
D) none of the above

Answer: B
Diff: 2
Section: 14.2

53) Suppose the local market for legal services has an upward sloping supply curve, $P_L = 150 + 0.0001Q_L$ where P_L is the price of legal services and Q_L is the number of hours of legal services. If the equilibrium price of legal services is $250 per hour, what is the aggregate economic rent earned by lawyers in this market?
A) $50,000
B) $1,000,000
C) $50,000,000
D) $100,000,000

Answer: C
Diff: 1
Section: 14.2

54) Suppose the local market for legal services has an upward sloping supply curve, $P_L = 150 + 0.0001Q_L$ where P_L is the price of legal services and Q_L is the number of hours of legal services. If the equilibrium price of legal services is $250 per hour and the average number of hours that a lawyer works per year is 2,500, what is the average economic rent earned per lawyer in this market?

A) $10,000 B) $20,000 C) $50,000 D) $1,000,000

Answer: B
Diff: 1
Section: 14.2

55) Suppose the supply of land is infinitely inelastic and the demand for land is downward sloping but inelastic at the current equilibrium. If the supply curve shifts rightward (e.g., previously unusable land is cleared for production), what happens to the aggregate economic rents in this market?

A) Decrease
B) Increase
C) Remain the same
D) We do not have enough information to answer this question.

Answer: A
Diff: 3
Section: 14.2

56) For a monopsony buyer of an input, the marginal expenditure curve

A) lies above the average expenditure curve.
B) lies below the average expenditure curve.
C) is identical to the average expenditure curve.
D) lies below the input demand curve.

Answer: A
Diff: 1
Section: 14.3

57) Which of the following statements is TRUE when comparing monopsony and competitive labor markets?

A) The monopsony hires more workers but pays a lower wage.
B) The monopsony hires more workers at a higher wage.
C) The monopsonist's wage is lower and quantity of labor higher than would prevail under competition.
D) The monopsonist's wage and quantity of labor are lower than would prevail under perfect competition.

Answer: D
Diff: 1
Section: 14.3

58) The marginal expenditure curve for labor is based on the assumption that
A) the most productive workers are hired first.
B) the wage rate is independent of the quantity of labor employed.
C) the market supply curve for labor is infinitely elastic.
D) all workers are paid the same wage rate.
E) none of the above

Answer: D
Diff: 1
Section: 14.3

59) Which of the following is TRUE concerning equilibrium in a monopsonistic factor market?
A) The firm uses the efficient level of the input but does not maximize profit.
B) The firm maximizes profit but does not use the efficient level of the input.
C) The firm maximizes profit and uses the efficient level of the input.
D) The firm either maximizes profit or uses the efficient level of the input, but it cannot do both at the same time.

Answer: B
Diff: 1
Section: 14.3

60) In the United States, major league baseball is exempt from antitrust laws. Before 1975, the baseball team owners agreed to hold an annual draft of amateur baseball players. Once the players were drafted and signed by a team, they were effectively tied to that team for life. This allowed baseball owners to operate like _____ in the market for player services.
A) perfect competitors
B) monopolistic competitors
C) a monopsonistic cartel
D) a monopoly

Answer: C
Diff: 1
Section: 14.3

61) In the United States, major league baseball is exempt from antitrust laws. Before 1975, the baseball team owners agreed to hold an annual draft of amateur baseball players. Once the players were drafted and signed by a team, they were effectively tied to that team for life. Before 1975, professional baseball players were paid:
A) less than their marginal revenue product.
B) their marginal revenue product.
C) more than their marginal revenue product.
D) none of the above is necessarily correct.

Answer: A
Diff: 1
Section: 14.3

62) When contemplating the purchase of a resource, the pure monopsonist should do which of the following to maximize profit?
A) Purchase enough to make the marginal expenditure equal to the marginal revenue product.
B) Purchase enough to make the average expenditure equal to the marginal revenue product.
C) Pay a wage equal to the value of MRP at the intersection of MRP and ME curves.
D) Pay a wage equal to the value of MRP at the intersection of AE and MRP curves.

Answer: A
Diff: 2
Section: 14.3

63) If the factor supply curve facing a monopolist is the market supply curve, and if the market supply curve is an upward sloping straight line, the marginal expenditure curve
A) lies below the market supply curve.
B) lies above the market supply curve.
C) is the market supply curve.
D) crosses the market supply curve at the market wage rate.
E) either A or B is possible.

Answer: B
Diff: 2
Section: 14.3

Scenario 14.4:
John's firm is a competitor in your product market and a monopsonist in the labor market. The current market price of the product that your firm produces is $2. The total product and marginal product of labor are given as:

$TP = 100L - 0.125L^2$ $MP = 100 - 0.25L$

where L is the amount of labor employed. The supply curve for labor and the marginal expenditure curve for labor are given as follows:

$L = P_L - 5$ $ME_L = 2L + 5$

64) Refer to Scenario 14.4. How much will the monopsonist pay each worker?
A) 0 B) 78 C) 83 D) 92 E) 100

Answer: C
Diff: 2
Section: 14.3

65) Refer to Scenario 14.4. Suppose that the price of the product rises to $5, the number of workers hired
A) will decrease.
B) will increase.
C) will not change.
D) cannot be determined without knowing the wage rate.

Answer: B
Diff: 2
Section: 14.3

66) Refer to Scenario 14.4. Suppose that the price of the product rises to $5. Which of the following curves shifts?
A) MP curve
B) MRP curve
C) Supply of labor curve
D) Marginal expenditure curve

Answer: B
Diff: 2
Section: 14.3

67) Refer to Scenario 14.4. Suppose that the price of the product rises to $5, the price of labor
A) will decrease.
B) will increase.
C) will not change.
D) will change in an indeterminate fashion.

Answer: B
Diff: 2
Section: 14.3

68) Refer to Scenario 14.4. Suppose that a subsidy is implemented on each unit of labor hired. Then the number of workers hired
A) will decrease.
B) will increase.
C) will not change.
D) will change in an indeterminate fashion.

Answer: B
Diff: 2
Section: 14.3

69) Refer to Scenario 14.4. Suppose that a pollution tax is imposed on each unit of a firm's output. The number of workers hired
A) will decrease.
B) will increase.
C) will not change.
D) will change in an indeterminate fashion.

Answer: A
Diff: 2
Section: 14.3

70) Refer to Scenario 14.4. Suppose that a tax is imposed on each unit of the product that John produces. Which curve will shift?
A) Marginal product of labor
B) Marginal revenue of the product of labor
C) The supply of labor
D) All of the above will shift due to the tax on output.

Answer: B
Diff: 3
Section: 14.3

71) There is always some economic rent whenever
A) demand for a factor is downward sloping.
B) supply of a factor is upward sloping.
C) supply and demand intersect.
D) supply of a factor is horizontal.

Answer: B
Diff: 1
Section: 14.3

72) Who does NOT earn economic rent in a competitive factor market?
A) No one
B) Everyone
C) The last factor of production hired
D) The inframarginal workers
E) Only owners of physical properties earn economic rents

Answer: C
Diff: 1
Section: 14.3

73) Why doesn't the marginal worker hired earn economic rent in a competitive labor market?
A) His reservation wage is less than the wage.
B) His reservation wage is greater than the wage.
C) His reservation wage is equal to the wage.
D) He is paid a wage that is lower than the others.

Answer: C
Diff: 1
Section: 14.3

74) Suppose the upward sloping labor supply curve shifts leftward in a labor market with a single employer (monopsony). What happens to the marginal expenditure curve?
A) Shifts left
B) Shifts right
C) Remains the same
D) We do not have enough information to answer this question.

Answer: A
Diff: 1
Section: 14.3

75) Suppose the upward sloping labor supply curve shifts leftward in a labor market with a single employer (monopsony). What happens to the equilibrium wage and level of employment in the market?
A) Wage and level of employment increase.
B) Wage increases and level of employment declines.
C) Wage decreases and level of employment increases.
D) Wage and level of employment decline.

Answer: B
Diff: 2
Section: 14.3

76) Suppose the downward sloping labor demand curve shifts rightward in a labor market with a single employer (monopsony). What happens to the equilibrium wage and level of employment in the market?
A) Wage and level of employment increase.
B) Wage increases and level of employment declines.
C) Wage decreases and level of employment increases.
D) Wage and level of employment decline.

Answer: A
Diff: 2
Section: 14.3

77) Suppose the downward sloping labor demand curve shifts rightward in a labor market with a single employer (monopsony). What happens to the marginal expenditure curve?
A) Shifts left
B) Shifts right
C) Remains the same
D) We do not have enough information to answer this question.

Answer: C
Diff: 1
Section: 14.3

78) A major computer software company maintains a technical support center in a rural area and is the only employer in this region. Suppose the firm develops a new software system for managing technical support calls, and the marginal product of labor increases. What happens to the equilibrium outcome in this labor market?
A) Labor demand shifts rightward, equilibrium wage and employment levels decline
B) Labor demand shifts rightward, equilibrium wage and employment levels increase
C) Labor demand curve remains the same, equilibrium wage and employment levels increase
D) Labor demand curve remains the same, equilibrium wage and employment do not change
E) none of the above

Answer: B
Diff: 2
Section: 14.3

79) In the situation involving a bilateral monopoly, a
A) single firm acts as both the monopsonist and the monopoly.
B) single seller sells to a single buyer.
C) monopsonist sells to a monopsonist.
D) monopolist sells to a monopolist.

Answer: B
Diff: 1
Section: 14.4

80) An example of monopoly power in input markets is
A) major league baseball owners in the market for player services.
B) the United Auto Workers union in the market for auto worker services.
C) OPEC in the market for crude oil.
D) all of the above

Answer: B
Diff: 1
Section: 14.4

81) When comparing the market price of an input in a market characterized by bilateral monopoly to a perfectly competitive price
A) the bilateral monopoly price is always higher than the competitive price.
B) there is no difference; the bilateral monopoly price equals the competitive price.
C) the bilateral monopoly price is always less than the competitive price.
D) the bilateral monopoly price can be higher than, lower than, or equal to the competitive price.

Answer: D
Diff: 1
Section: 14.4

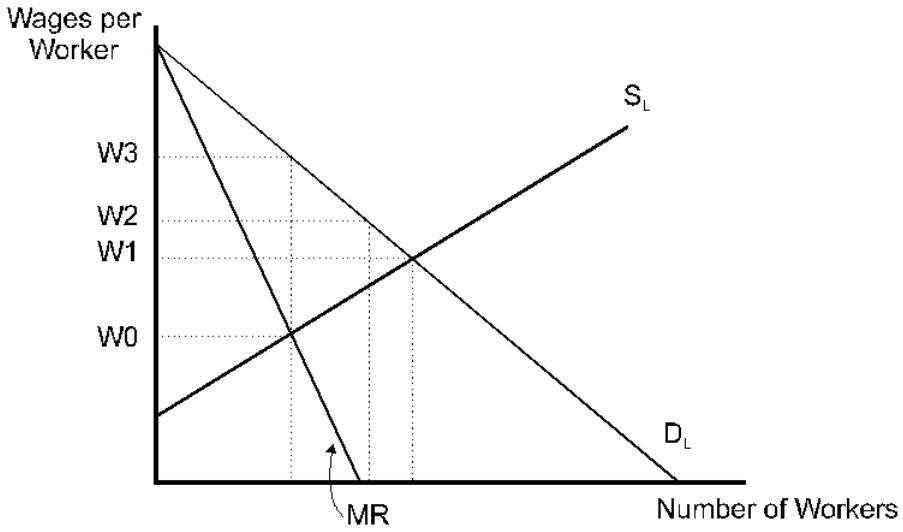


Figure 14.3

A labor union is exercising monopoly power in the labor market.

82) Refer to Figure 14.3. To maximize economic rent, the labor union will agree to wage rate:
A) W_0.
B) W_1.
C) W_2.
D) W_3.
E) none of the above

Answer: D
Diff: 2
Section: 14.4

83) Refer to Figure 14.3. To maximize total wages paid to workers, the labor union will agree to wage rate:
A) W_0.
B) W_1.
C) W_2.
D) W_3.
E) none of the above

Answer: C
Diff: 3
Section: 14.4

84) Refer to Figure 14.3. To maximize the number of workers hired, the labor union will agree to wage rate:
A) W_0.
B) W_1.
C) W_2.
D) W_3.
E) none of the above

Answer: B
Diff: 2
Section: 14.4

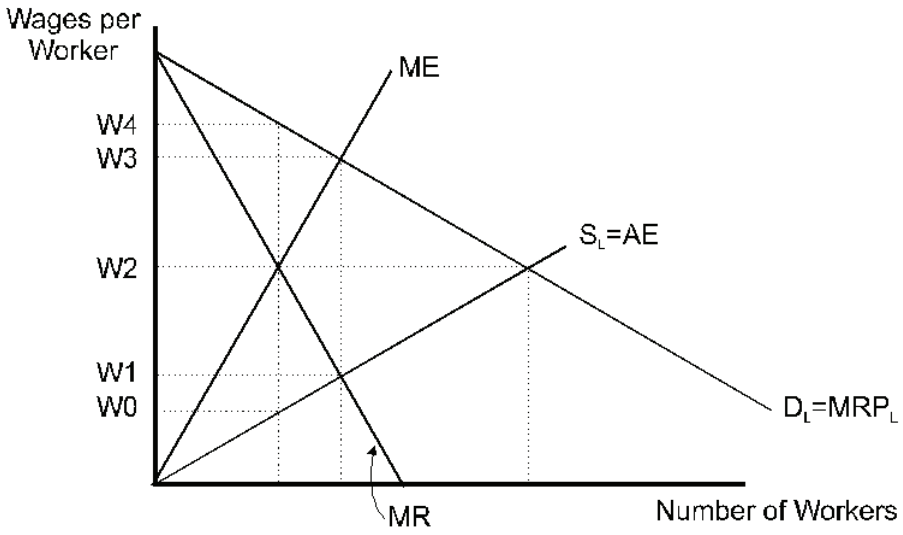


Figure 14.4

85) Given the information in Figure 14.4, the competitive wage rate is:
A) W_1.
B) W_2.
C) W_3.
D) W_4.
E) none of the above

Answer: B
Diff: 2
Section: 14.4

86) Given the information in Figure 14.4, the monopoly wage rate is:
A) W_1.
B) W_2.
C) W_3.
D) W_4.
E) none of the above

Answer: C
Diff: 2
Section: 14.4

87) Given the information in Figure 14.4, the monopsony wage rate is:
A) W_1.
B) W_2.
C) W_3.
D) W_4.
E) none of the above

Answer: A
Diff: 2
Section: 14.4

88) Given the information in Figure 14.4, the bilateral monopoly wage rate is:
A) W_1.
B) W_2.
C) W_3.
D) W_4.
E) Any of the above.

Answer: E
Diff: 2
Section: 14.4

89) Suppose a labor market has perfectly inelastic supply that is composed of union and non–union workers, and both groups of workers earn the perfectly competitive wage. What happens to the equilibrium employment level and wage for union workers?
A) Both increase.
B) Employment increases and wage declines.
C) Wage increases and employment declines.
D) Both decline.

Answer: C
Diff: 2
Section: 14.4

90) Suppose a labor market has perfectly inelastic supply that is composed of union and non–union workers, and both groups of workers earn the perfectly competitive wage. What happens to the equilibrium employment level and wage for non–union workers?
A) Both increase.
B) Employment increases and wage declines.
C) Wage increases and employment declines.
D) Both decline.

Answer: B
Diff: 2
Section: 14.4

91) Suppose a labor market has perfectly inelastic supply that is composed of union and non–union workers, and the union shifts its policy from maximizing total economic rents to maximizing total wages earned by members. What happens to the equilibrium employment level and wage for non–union workers?
A) Both increase.
B) Employment increases and wage declines.
C) Wage increases and employment declines.
D) Both decline.

Answer: C
Diff: 2
Section: 14.4

92) Use the following statements to answer this question:
I. A positive deadweight loss necessarily occurs in labor markets that have one seller (e.g., labor union).
II. The deadweight loss in a labor market with one seller (e.g., labor union) is smaller if the union maximizes the total wages earned by union members than if the union maximizes total economic rents.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: C
Diff: 2
Section: 14.4

93) Suppose the federal government allows labor unions to act as the sole seller in labor markets, but the government collects an annual $10,000,000 "administrative fee" from each union in this situation. Assuming this fee is not so large that it forces the unions to disband, what is the impact of this fee on the equilibrium wage and employment level in the monopolized labor market?
A) Wages and employment decline.
B) Wages increase and employment declines.
C) Employment increases and wages decline.
D) No change in wages or employment levels.

Answer: D
Diff: 2
Section: 14.4

94) Clarke Mementos manufactures small figurines that they sell to retailers around the country. Clarke sells the figurines for $5.00 each, a price the firm considers given. Clarke's production function is given by the expression:

$$Q = 60L - 0.5L^2,$$

where Q = number of figurines per day, and L = number of skilled workers per day. Based on this production function, the average and marginal products of labor are as follows:

$$AP = 60 - 0.5L \qquad MP = 60 - L$$

a. Write an expression for the firm's marginal revenue product.
b. Clarke currently pays $150 per day (including fringe benefits) for each of its skilled workers. How many workers should the firm employ?
c. Clarke's workers are highly skilled artisans with a great deal of job mobility. The firm's managers fear that they must increase the workers' total compensation to $200 per day to remain competitive. What impact would the wage increase have upon the firm's employment?

Answer: ***a.***

$$MRP = MR \cdot MP$$

P = MR since the firm regards price as given

$$P = 5$$

$$MRP = 5(60 - L) = 300 - 5L$$

b.

Equate MRP to wage:

$$300 - 5L = 150$$
$$5L = -150$$
$$L = 30$$

c.

At the new wage of 200,

$$300 - 5L = 200$$
$$-5L = -100$$
$$L = 20$$

Employment would fall from 30 to 20.

Diff: 2
Section: 14.1

95) Use the data in the table below to answer the following questions about a firm.

Units of Input X	Units of Input Y	Total Product	Marginal Product of X	Output Price
0	25	0		$10
1	25	2		10
2	25	7		10
3	25	14		10
4	25	20		10
5	25	23		10
6	25	24		10

a. Complete the table by calculating the marginal product of input X.
b. Compute the marginal revenue produce of input X.
c. If the price of input X were $30 per unit, how many units should the firm use per unit of time to maximize profit? Explain why profit is maximized.

Answer: ***a.***

The MP_X values are: 2, 5, 7, 6, 3, 1

b.

$MRP_X = MP_X \cdot MR_Q$ = 20, 50, 70, 60, 30, 10

c.

Equate ME to MRP to get 5 units of input. Profit is maximized because the marginal expenditure for the last unit of X hired just equals the marginal revenue generated. Also MRP_X is decreasing as more X is hired; this is associated with a maximum.

Diff: 1
Section: 14.1

96) The table below shows a firm's output per day for zero through six workers.

Q	L
0	0
46	1
84	2
114	3
136	4
150	5
156	6

The firm's demand and marginal revenue curves are:

$$P = 50 - 0.125Q \qquad MR = 50 - 0.25Q,$$

where Q = daily sales, and P = output price.

a. Determine the marginal product of labor for one through six workers.

b. Determine the firm's marginal revenue product.

c. How many workers should the firm hire if total wage costs including fringe benefits are $30 per hour? (Each worker is employed for eight hours per day.)

Answer: ***a.***

Marginal product is change in total product from one more worker.

Q	L	MP
0	0	—
46	1	46
84	2	38
114	3	30
136	4	22
150	5	14
156	6	6

b.

$MRP = MR \cdot MP_L$

We must determine MR at levels of output corresponding to one through six workers.

MR	=	50 – 0.25Q	=	
MR(46)	=	50 – 0.25(46)	=	38.50
MR(84)	=	50 – 0.25(84)	=	29.00
MR(114)	=	50 – 0.25(114)	=	21.50
MR(136)	=	50 – 0.25(136)	=	16.00
MR(150)	=	50 – 0.25(150)	=	12.50
MR(156)	=	50 – 0.25(156)	=	11.00

$MRP = MR \cdot MP_L$

L	Q	MP	MR	MRP
1	46	46	38.50	1771
2	84	38	29.00	1102
3	114	30	21.50	645

4	136	22	16.00	352
5	150	14	12.50	175
6	156	6	11.00	66

c.

The firm would want to hire every worker whose MRP $\geq$ W. Thirty dollars per hour is $240 per day. The firm would want to hire four workers.

Diff: 2
Section: 14.1

97) In a competitive labor market, the supply of labor curve is expressed as:

AE = $5 + 0.0025L,

where AE represents the average expenditure ($/unit) and L represents units of labor hired per unit of time. The demand for labor is based on the following expression:

MP = 5 – 0.001L,

where MP represents marginal product of labor. Revenue from the final good is $5 per unit sold in a competitive market.

a. Determine the equilibrium wage rate and labor employment rate.
b. Compute the economic rent earned by labor.

Answer: ***a.***

The equilibrium employment rate is determined where supply and demand curve intersect. Supply is given in the form of AE. Demand is the MRP of labor. This is:

MRP = $(MP)^*(MR)$
= (5 – 0.0001L)(5)
= 25 – 0.005L

Find equilibrium L by equating MRP to AE.

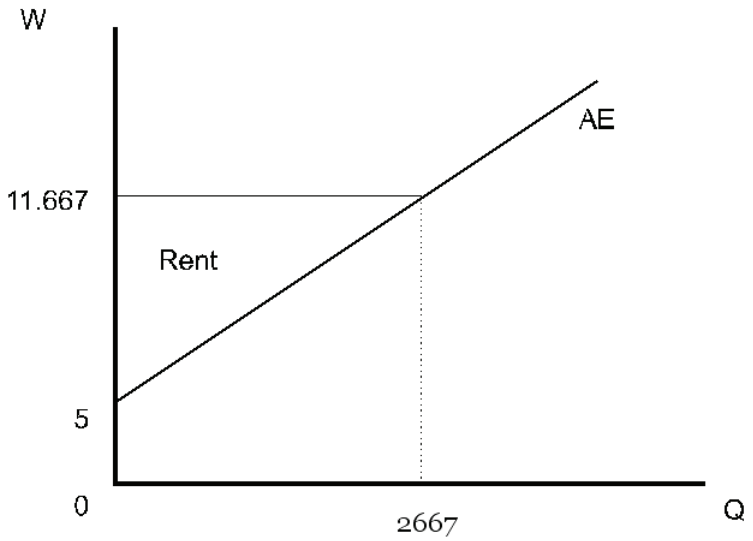
25 – 0.005L = 5 + 0.0025L
20 = 0.0075L
L = 2,667 units

The equilibrium wage rate is:

AE = 5 + 0.0025(2,667)
=$11.667 per unit

b.

Economic rent is the area of the triangle bounded by wage = 11.667, AE out to 2,667, and zero employment rate. This is a triangle.



Rent = (1/2)(b)(h) = (1/2)(2,667)(6.667)
= $8,890.44 per unit of time.

Diff: 2
Section: 14.2

98) The market for production workers in a Midwestern metropolitan area is highly competitive. The market supply and demand curves for production workers are given as:

$L_S = -2500 + 1000W \quad L_D = 10500 - 625W,$

where L_D = labor demand is full time workers per hour,

L_S = labor supply is full time workers per hour,

and W = hourly wage. White Manufacturing Co. employs production workers in the manufacture of bearings for skate boards. The firm's production function is given by the expression:

$Q = 88.8L - 0.5L^2,$

where Q = output, measured as boxes of bearings per hour, and L = number of workers employed per hour. From this production function, the marginal product and average product of labor are:

$MP = 88.8 - L \qquad AP = 88.8 - 0.5L$

White currently sells bearings for $10 per box.

a. Determine the equilibrium wage and level of employment in the market. Calculate the total rent that is being earned by workers.

b. Determine the number of workers that White Manufacturing would employ at the wage determined in part (a). What total output will White produce?

Answer: ***a.***

$L_S = -2500 + 1000W$

$L_D = 10500 - 625W$

Equate L_S to L_D.

$-2,500 + 1,000W = 10,500 - 625W$

$-13,000 = -1,625W$

$W = \$8.000$

$L_S = -2,500 + 1,000(8)$

$L = 5,500$

To calculate rent, one must solve for W in the supply and demand curves.

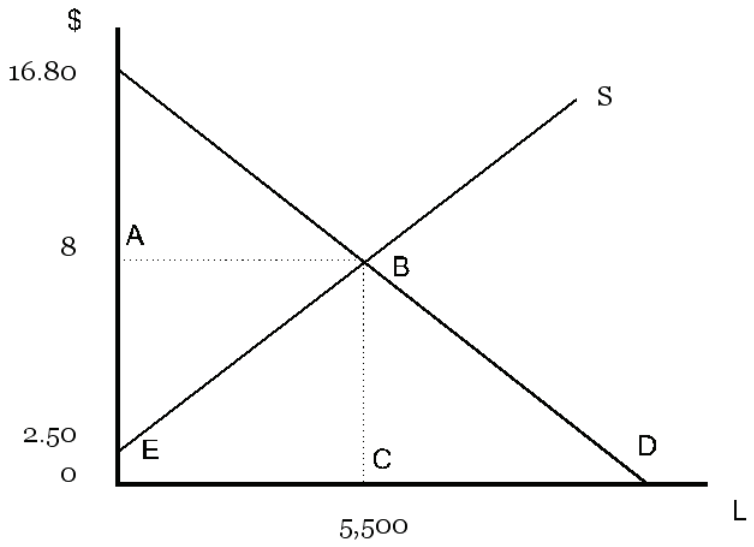
$L_S = -2,500 + 1,000W$

$L_S + 2,500 = 1,000W$

$W = 2.5 + 0.001L_S$

$L_D = 10,500 - 625W$

$W = 16.8 - 0.0016L_D$



rent = Area ABE = (0.5)(5,500)(8 – 2.50) = 15,125

b.

Equate MRP to wage (determined to be $8.00)

888 – 10L = 8

–10L = –880

L = 88

To determine output, substitute L into production function

$Q = 88.8(88) - 0.5(88)^2$

Q = 3,942.4

Diff: 2
Section: 14.2

99) The following expressions describe a perfectly competitive labor market. The labor supply curve is:

$S_L = AE = \$3.00 + \$0.000375L.$

The marginal revenue product of labor curve is:

$MRP_L = \$13.00 - 0.000433L.$

a. Find the equilibrium wage in this labor market. Also, find the optimal number of labor hours worked per week. Let L represent the number of labor hours worked per week, and let W represent the hourly wage of workers.

b. Determine the economic rent earned by labor in this situation.

Answer: ***a.***

The equilibrium wage and number of labor hours worked per week are determined at the intersection of the supply and demand for labor curves. These curves are represented by AE and MRP. Equate these two curves to get L first.

$3.00 + 0.000375L = 13 - 0.000433L$

$L = 12{,}376.24$

Insert L into the MRP curve to get equilibrium wage rate.

$W = MPL = 13.00 - 0.000433(12{,}376.24)$

$W = \$7.64$

b.

The economic rent is the area of the triangle between W ($7.64) and AE bounded by L = 0 and L = 12,376.24.

The area is (1/2)(base)(height)

$b = 12{,}376.24 - 0 = 12{,}376.24$

$h' = 7.64 - 3 = 4.64$

economic rent = $(1/2)(12{,}376.24)(4.64) = \$28{,}712.88$

Diff: 2
Section: 14.2

100) In some markets plumbers have a choice of joining unions or working as nonunion plumbers. The total short–run supply of plumbers is perfectly inelastic at 500 workers per day. The demands for nonunionized and unionized plumbers, respectively, are:

$W_{NU} = 30 - 0.04L$ $W_U = 30 - 0.10L$.

The wage rate is W in $/hr. and the number of workers per day is L.

a. Determine the total demand for plumbers.
b. Calculate the total market wage rate of plumbers assuming that unionized and nonunionized plumbers get the same wage rate.
c. If the unionized workers succeeded in getting their wage increased to $20.00 per hour, how many unionized workers would lose their jobs?
d. If the unionized workers in (c) who lost their jobs take jobs as non–unionized workers, how much and in what direction would non–unionized wages change?

Answer: ***a.***

The total demand for workers is the horizontal summation of the unionized and non–unionized demands. We rearrange the demands to get L in terms of wage. The demand for non–unionized plumbers is now expressed as

$L_{NU} = 750 - 25W$, and

the demand for unionized plumbers is now expressed as

$L_U = 300 - 10W$

The sum of the two demands yields total demand.

$L = 1{,}050 - 35W$

or in terms of L: $W = 30 - 0.0286L$

b.

The market wage rate is

$1{,}050 - 35W = 500$

$W = \$15.71$/hour

c.

At the higher wage of $20.00 per hour, $L_U = 300 - 10(20) = 100$ per day. This is down from $L_U = 300 - 10(15.71) = 143$ per day. A total of 43 workers would lose their unionized jobs.

d.

If the 43 workers take non–unionized jobs, the non–union wage rate would fall. The total non–unionized workers was

$L = 750 - 25(15.71) = 357.25$ or 357

Now, the total number of non–unionized workers becomes

$L = 357 + 43$

At 400 workers, the new non–unionized wage is

$W_{NU} = 30 - 0.04(400) = \$14.00$/hour

Diff: 3
Section: 14.2

101) Data in the following table refer to the purchase of a resource by a pure monopsonist. Let the resource be labor time L, measured in hundreds of hours per day.

Units of Labor Input L	Marginal Expenditure ME	Average Expenditure AE	Marginal Revenue Product MRP
1	10	10	16
2	12	11	15
3	14	12	14
4	16	13	13
5	18	14	12
6	20	15	11
7	22	16	10
8	24	17	9

a. Determine the profit maximizing purchase rate of labor for the monopsonist.
b. If this market were not monopsonistic but competitive, what would be the purchase rate of labor time?
c. Determine the equilibrium wage rate in both the monopsonistic and competitive markets?

Answer: ***a.***
Equate ME to MRP. This occurs at L = 3.

b.
Equate AE to MRP. This occurs at L = 4.

c.
The wage rate for the monopsonist would be the value of AE at L = 3. Thus, wage = 12. The wage rate in the competitive market would be the value of MRP at the intersection with AE. Thus, wage = 13.

Diff: 2
Section: 14.3

102) If clerical workers in your state voted to have a union represent them in negotiations with employers, they would have monopoly power in wage determination. Employers would be in no position to exert monopsony power in their employment of clerks in this market due to the large number of employers in the market. Labor supply is given by

$L_S = 50W - 100$

(or, equivalently $W = L_S/50 + 2$)

Labor demand is given by

$L_D = 700 - 25W$

(or, equivalently $W = -L_D/25 + 28$)

a. What is the equation for marginal revenue?

b. Using the supply and demand equations, compute the wage rate and number of workers that would be hired when there is no union representation.

c. Using the supply and demand equations, compute the wage rate and number of workers hired when the union represents workers and acts to maximize aggregate wages to all workers hired.

d. Explain the impact of (c) on the competitive market.

Answer: ***a.***

Marginal revenue is given by $MR = (-2/25)L + 28$. It is twice as steep as labor demand and has the same vertical intercept.

b.

Equate L_S to L_D. Then we have

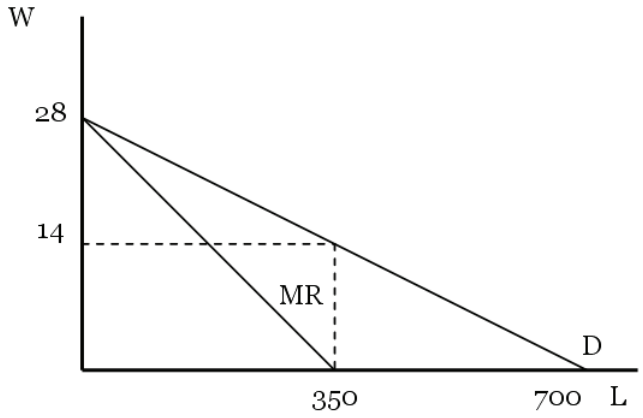
$50W - 100 = 700 - 25W$

$W = 10.67$

Plug W into labor supply or labor demand to get $L = 433$. (Since either the supply equation or the demand equation may be used here, students' answers will differ slightly due to rounding.)

c.

Find the value of L where $MR = 0$. This occurs at $L = 350$. Plugging this into the demand equation, we obtain $W = \$14$.



d.

The union has the effect of a monopolist that reduces employment and raises wages.

Diff: 2
Section: 14.4

103) The marginal product of labor at One Guy's Pizza is $MP_L(L) = \frac{4}{\sqrt{L}}$. One Guy's pays each unit of labor the minimum wage of \$6.00. Also, One Guy's can sell all the pizza it produces for \$12. What is the optimal level of labor employment for One Guy's pizza? If the minimum wage is raised to \$8, what impact will this have on One Guy's optimal labor employment level?

Answer: One Guy's marginal revenue of the product of labor is:

$MRP_L(L) = MP_L(MR) = MP_L(12) = \frac{48}{\sqrt{L}}$. To maximize profits, One Guy's must equate the marginal revenue of the product of labor to the wage rate. This is:

$\frac{48}{\sqrt{L}} = \$6 \Leftrightarrow L = 64$. Thus, One Guy's optimal employment of labor is 64 units. If the minimum wage is raised to \$8, the optimal level of employment becomes

$\frac{48}{\sqrt{L}} = \$8 \Leftrightarrow L = 36$. That is, One Guy's optimal employment of labor falls to 36 units if the minimum wage rises by one third.

Diff: 2
Section: 14.4

104) The marginal product of labor at Ronald's Outboard Motor Manufacturing plant is $MP_L(L) = \frac{100}{\sqrt{L}}$ Ronald can sell every unit of output he produces for \$100. Determine Ronald's marginal revenue of the product of labor. If Ronald can hire all the labor hours he would like at \$15, calculate Ronald's optimal employment level. If the wage rate falls to \$10, calculate Ronald's new level of employment.

Answer: Ronald's marginal revenue of the product of labor is

$MRP_L(L) = MP_L(L) * MR = \frac{10{,}000}{\sqrt{L}}$. Ronald sets the marginal revenue of the product of labor equal to the wage rate to determine his optimal employment level of labor. This is: $\frac{10{,}000}{\sqrt{L}} = \$15 \Leftrightarrow L = 444{,}444.44$. If the wage rate falls to \$10, Ronald's new level of employment becomes: $\frac{10{,}000}{\sqrt{L}} = \$10 \Leftrightarrow L = 1{,}000{,}000$.

Diff: 1
Section: 14.4

105) The marginal product of labor at Trisha's Fashion Boutique is $MP_L(L) = \frac{1}{2} - 0.01L$. Trisha can sell all the output she can produce for \$100 a unit. If Trisha pays a wage rate of \$20 per unit of labor, calculate Trisha's optimal labor employment level. If the wage rate rises to \$25 per unit, what happens to Trisha's optimal employment level?

Answer: Trisha's marginal revenue of the product of labor is: $MRP_L(L) = MP_L(L) * MR = \left(\frac{1}{2} - 0.01L\right)100 = 50 - L$. Trisha's optimal employment level of labor corresponds to $MRP_L(L) = w \Rightarrow 50 - L = 20 = 30$. If the wage rate rises to \$20, Trisha's optimal level of employment becomes 25 units. Thus, an increase in the wage rate of 25% results in less than a 17% reduction in employment.

Diff: 1
Section: 14.4

106) A new pizza producing technology changes One Guy's marginal product of labor from $MP_L(L) = \frac{4}{\sqrt{L}}$ to $MP'_L(L) = \frac{8}{\sqrt{L}}$. If One Guy's can sell all the pizza it produces for \$12 and pays each unit of labor \$8, what happens to the level of employment due to this technology change?

Answer: One Guy's old marginal revenue of the product of labor is $MRP_L(L) = \frac{48}{\sqrt{L}}$. For this original level of technology, One Guy's optimal employment usage was $\frac{48}{\sqrt{L}} = 8 \Leftrightarrow L = 36$. At the new level of technology, One Guy's marginal revenue of the product of labor becomes $MRP'_L(L) = \frac{96}{\sqrt{L}}$. The new level of employment becomes: $\frac{96}{\sqrt{L}} = 8 \Leftrightarrow L = 144$. Thus, this increase in technology results in a quadrupling in the level of employment.

Diff: 1
Section: 14.4

107) A new motor manufacturing technology changes Ronald's Outboard Motor marginal product of labor from $MP_L(L) = \frac{100}{\sqrt{L}}$ to $MP'_L(L) = \frac{102}{\sqrt{L}}$. If Ronald can sell all the motors he produces for \$100 and pays each unit of labor \$10, what happens to the level of employment due to this technology change?

Answer: Ronald's original marginal revenue of the product of labor is $MRP_L(L) = \frac{10{,}000}{\sqrt{L}}$. For this original level of technology, Ronald's optimal labor employment was $\frac{10{,}000}{\sqrt{L}} = 10 \Leftrightarrow L = 1{,}000{,}000$. At the new level of technology, Ronald's marginal revenue of the product of labor becomes $MRP'_L(L) = \frac{10{,}200}{\sqrt{L}}$. The new level of employment becomes: $\frac{10{,}200}{\sqrt{L}} = 10 \Leftrightarrow L = 1{,}040{,}400$. Thus, this increase in technology results in over a 4% increase in the level of labor employment.

Diff: 2
Section: 14.4

108) An increase in technology in fabric design changes Trisha's marginal product of labor function from $MP_L(L) = 0.5 - 0.01L$ to $MP'_L(L) = 0.625 - 0.01L$. If Trisha can sell all the output she desires at \$120 and she must pay each unit of labor she employs \$24, what effect does the change in technology have on labor employment?

Answer: Trisha's original marginal revenue of the product of labor is $MRP_L(L) = 60 - 12L$. For this original level of technology, Trisha's optimal labor employment was $60 - 12L = 24 \Leftrightarrow L = 3$. At the new level of technology, Trisha's marginal revenue of the product of labor becomes $MRP'_L(L) = 75 - 12L$. The new level of employment becomes: $75 - 12L = 24 \Leftrightarrow L = 4.25$. Thus, this increase in technology results in over a 41% increase in the level of labor employment.

Diff: 1
Section: 14.4

109) Currently, One Guy's uses 4 ovens in the production of pizzas (K represents the number of ovens). One Guy's marginal product of labor function is $MP_L(L, K) = \frac{K}{\sqrt{L}}$. One Guy's can sell all the pizzas it produces for \$12 per unit and hire all the labor units it desires at \$8 per unit. What happens to One Guy's optimal labor employment if it increases the number of ovens to 5?

Answer: One Guy's marginal revenue of the product of labor is: $MRP_L(L, K) = MP_L(L, K) * MR = \frac{12K}{\sqrt{L}}$. With 4 ovens, the optimal employment of labor is: $MRP_L = \frac{12(K)}{\sqrt{L}} = \frac{48}{\sqrt{L}} = 8 \Leftrightarrow L = 36$. If the number of ovens increases to 5, the optimal employment of labor is: $MRP_L = \frac{12(K)}{\sqrt{L}} = \frac{60}{\sqrt{L}} = 8 \Leftrightarrow L = 56.25$. Thus, increasing the number of ovens from 4 to 5 increases the optimal employment of labor by 56.25%.

Diff: 2
Section: 14.4

110) Currently, Ronald's Outboard Motor Manufacturing uses 100 power drills in the production of motors (K represents the number of power drills). Ronald's marginal product of labor function is $MP_L(L, K) = \frac{K}{\sqrt{L}}$. Ronald can sell all the motors he produces for \$100 per unit and hire all the labor units he desire at \$10 per unit. What happens to Ronald's optimal labor employment if he decreases the number of power drills to 90?

Answer: Ronald's marginal revenue of the product of labor is:

$MRP_L(L, K) = MP_L(L, K) * MR = \frac{100K}{\sqrt{L}}$. With 100 power drills, the optimal employment of labor is: $MRP_L = \frac{100(K)}{\sqrt{L}} = \frac{10{,}000}{\sqrt{L}} = 10 \Leftrightarrow L = 1{,}000{,}000$. If the number of power drills decreases to 90, the optimal employment of labor is: $MRP_L = \frac{100(K)}{\sqrt{L}} = \frac{9{,}000}{\sqrt{L}} = 10 \Leftrightarrow L = 810{,}000$. Thus, decreasing the number of power drills from 100 to 90 decreases the optimal employment of labor by 19%.

Diff: 2
Section: 14.4

111) Currently, Trisha's Fashion Boutique uses 2 sewing machines in the production of dresses (K represents the number of sewing machines). Trisha's marginal product of labor function is $MP_L(L, K) = \frac{K}{2} - 0.01L$. Trisha can sell all the dresses she produces for \$150 per unit and hire all the labor units she desires at \$25 per unit. What happens to Trisha's optimal labor employment if she increases the number of sewing machines to 4?

Answer: Trisha's marginal revenue of the product of labor is:

$MRP_L(L,K) = MP_L(L, K) * MR = (0.5K - 0.01L)150 = 75K - 1.5L$.

With 2 sewing machines, the optimal employment of labor is:

$MRP_L = 75K - 1.5L = 150 - 1.5L = 25$. Therefore we have $L = 83.33$.

If the number of sewing machines increases to 4, the optimal employment of labor is:

$MRP_L = 75K - 1.5L = 300 - 1.5L = 25$. Therefore we obtain $L = 183.33$.

Thus, increasing the number of sewing machines from 2 to 4 increases the optimal employment of labor by 120%

Diff: 2
Section: 14.4

112) Mr. Barnes has a monopoly in the production of electricity in the local market. The relevant marginal revenue of electricity sales as a function of labor employment is: $MR(L) = 100{,}000 - 28.57\ L$. The marginal product of labor in electricity production is 0.01. Mr. Barnes is a price taker in the labor employment market, and the market price of labor is \$15. Determine Mr. Barnes' optimal employment of labor.

Answer: Mr. Barnes' marginal revenue of the product of labor is

$MRP_L(L) = MP_L * MR(L) = 1{,}000 - 0.29L$.

Mr. Barnes' must set the marginal revenue of the product of labor equal to the cost of labor in order to maximize profits. In this case, optimal employment is:

$1000 - 0.29L = 15$.

Therefore we have $L = 3{,}447.5$.

Diff: 1
Section: 14.4

113) Umberto has a monopoly in providing taxicab services in the local market. The relevant marginal revenue of taxicab sales as a function of labor employment is: $MR(L) = 10 - \frac{1}{50}L$. The marginal product of labor in providing taxicab services is 50. Umberto is a price taker in the labor employment market and the market price of labor is \$15. Determine Umberto's optimal employment of labor.

Answer: Umberto's marginal revenue of the product of labor is

$$MRP_L(L) = MP_L^* MR(L) = 500 - L$$

Umberto must set the marginal revenue of the product of labor equal to the cost of labor in order to maximize profits. In this case, optimal employment is:

$$500 - L = 15 \Leftrightarrow L = 485.$$

Diff: 1
Section: 14.4

114) Maureen's Custodial Services has a monopoly in custodial services in the local community. The relevant marginal revenue of custodial services as a function of labor employment is:

$$MR(L) = 70 - 0.029L.$$

The marginal product of labor in providing custodial services is 0.1. Maureen is a price taker in the labor employment market and the market price of labor is \$6. Determine Maureen's optimal employment of labor.

Answer: Maureen's marginal revenue of the product of labor is

$$MRP_L(L) = MP_L^* MR(L) = 7 - 0.0029L$$

Maureen must set the marginal revenue of the product of labor equal to the cost of labor in order to maximize profits. In this case, optimal employment must satisfy:

$$7 - 0.0029L = 6$$

Therefore we have $L = 350$.

Diff: 1
Section: 14.4

115) Mr. Barnes' Mine has a monopoly on coal production in the local community. Also, Mr. Barnes' Mine is the sole employer in the local community. The market supply of labor is:

$$L^S(w) = 50w - 250$$

Or equivalently

$$w = 50 + 0.02L^S$$

Mr. Barnes' wage bill is:

$$WB = 50L + 0.02L^2$$

The resulting marginal expenditure of labor function is:

$$ME(L) = 50 + 0.04L$$

The marginal product of coal as a function of labor is:

$$MP_L = 0.01.$$

The marginal revenue of coal sales as a function of labor is:

$$MR(L) = 100{,}000 - 28.57L$$

Determine Mr. Barnes' marginal revenue of the product of labor. What is Mr. Barnes' optimal employment of labor? What is the wage rate Mr. Barnes pays for a unit of labor?

Answer: Mr. Barnes' marginal revenue of the product of labor function is:

$$MRP_L(L) = MP_L(L)^*MR(L) = 1{,}000 - 0.29L$$

To maximize profits, Mr. Barnes sets the marginal revenue of the product of labor equal to the marginal expenditures on labor employment. In this case, the level of employment is determined as follows:

$$1{,}000 - 0.29L = 50 + 0.04L$$

Hence we have:

$$L = 2{,}916.67$$

In order for Mr. Barnes' to attract 2,916.67 units of labor, Mr. Barnes must pay a wage of:

$$w = 50 + 2{,}916.67/50 = 108.33.$$

Diff: 2
Section: 14.4

116) Edna has a monopoly in the sale of engineering services in the local market. Also, Edna is the only employer of high skilled labor in the local market. The marginal product of labor is:

$MP_L(L) = 250.$

The marginal revenue of engineering services is:

$MR(L) = 12{,}000 - 0.25L$

The local supply of high skilled labor is:

$L^S(w) = 200w - 10{,}000$

Or equivalently

$w = 50 + 0.005L^S$

This implies Edna's marginal high–skill labor wage bill expenditures is:

$ME(L) = 50 + 0.01L$

Determine Edna's optimal level of employment. Also, what is the wage rate Edna pays for a unit of high skilled labor? What is the marginal revenue of the product of labor at the optimal employment level? Suppose Edna acted as a wage taker in determining high–skilled labor employment. How much labor would she hire and at what wage rate? At this level of employment, calculate the marginal revenue of the product of labor.

Answer: To determine Edna's optimal level of employment given she is a monopsonist, we need to set: $MRP_L(L) = ME(L)$. Since Edna is a monopolist in the sale of engineering services,

$MRP_L(L) = MP_L(L)^*MR(L) = 250(12{,}000 - 0.25L) = 3{,}000{,}000 - 62.5L$

This information allows us to determine Edna's optimal employment of labor as:

$3{,}000{,}000 - 62.5L = 50 + \frac{L}{100} \Leftrightarrow L = 47{,}991.521$. We now use the information from labor supply to determine the wage rate Edna will pay. This wage rate is:

$w = 50 + \frac{(47{,}991.521)}{200} = \$289.96$. The marginal revenue of the product of labor at the optimal level of employment is:

$MRP_L(L = 47{,}991.521) = 3{,}000{,}000 - 62.5(47{,}991.521) = \$530$. If Edna acted as a wage taker in hiring labor, she would set: $MRP_L(L) = w$. In this case, Edna would employ

$3{,}000{,}000 - 62.5L = 50 + \frac{L}{100} \Leftrightarrow L = 47{,}995.36$. At this level of employment, the wage rate is: $w = 50 + \frac{(47{,}995.36)}{200} = \$289.98$. The marginal revenue of the product of labor at this employment level is \$289.98.

Diff: 3
Section: 14.4

Chapter 15 Investment, Time and Capital Markets

1) The marginal revenue product of capital inputs does not provide complete information about optimal use because capital is:
   A) money.
   B) not an input.
   C) an output as well as an input.
   D) durable.
   E) all of the above

Answer: D
Diff: 1
Section: 15.1

2) Which of the following questions is addressed when hiring capital, but not addressed when hiring labor?
   A) How much are future profits worth today?
   B) How much are today's profits worth in the future?
   C) How much are the future's profits worth in the future?
   D) How much are today's profits worth today?
   E) All questions present when capital is purchased are present when labor is purchased.

Answer: A
Diff: 1
Section: 15.1

3) Which is a stock variable?
   A) Labor B) Profit C) Income D) Capital E) Price

Answer: D
Diff: 1
Section: 15.1

4) If a firm can earn a profit stream of $50,000 per year for 10 years, that profit stream is worth
   A) more than $500,000 today.
   B) $500,000 today.
   C) less than $500,000 today, but a positive amount.
   D) nothing today
   E) some amount, but whether it is more, less or the same as $500,000 cannot be determined.

Answer: C
Diff: 1
Section: 15.1

5) To avoid the stock versus flow issue in production, some economists discuss capital usage in terms of rented capital. For example, your firm may not directly own some of the capital inputs to your production operation, and these capital inputs are employed on an hourly or daily basis. Which of the following inputs is a good example of a capital input that acts like a flow?
   A) Land and buildings that are owned by the firm
   B) A long–term licensing agreements that allow you to use a patented idea owned by another firm
   C) A forklift that is rented on an hourly basis
   D) all of the above

Answer: C
Diff: 2
Section: 15.1

6) The present value formula makes it apparent that:
   A) a decline in the interest rate will cause a decision maker to weigh recent period returns relatively more heavily than before the decline.
   B) an increase in the interest rate will cause a decision maker to weigh distant (or future) returns relatively more heavily than before the increase.
   C) the present value of a fixed sum decreases as the time until it is to be paid increases.
   D) all of the above
   E) both A and C.

Answer: C
Diff: 1
Section: 15.2

7) If the interest rate is 5%, in one period the value of $1 today is
   A) $1.20. B) $1.05. C) 95 cents. D) 20 cents. E) 5 cents.

Answer: B
Diff: 1
Section: 15.2

8) If the interest rate is 10%, the present value of $1 next year is
   A) $1.20. B) $1.10 C) 91 cents. D) 10 cents. E) 9 cents.

Answer: C
Diff: 1
Section: 15.2

9) You have won a contest and are allowed to choose between two prizes. One option is to receive $200 today and another $200 one year from now. The second option is $100 today and an additional $325 one year from now. At what interest rate (if any) is the present value of the two prizes identical?
   A) 0 percent
   B) 5 percent
   C) 10 percent
   D) 25 percent
   E) none of the above

Answer: D
Diff: 2
Section: 15.2

10) When the interest rate is R, the formula for finding the value of a current amount $M one year from now is
A) M (1 + R/100).
B) M (1 + R).
C) M / (1 + R).
D) M / R.
E) M / (100R).

Answer: B
Diff: 2
Section: 15.2

11) The formula for finding the present value of an amount M that will be received one year from now, when the interest rate is R, is
A) M × (1 + R/100).
B) M × (1 + R).
C) M / (1 + R).
D) M / R.
E) M / (100R).

Answer: C
Diff: 2
Section: 15.2

12) When the interest rate is R, the formula for finding the value of $M two years from now is
A) $M (1 + R)^2$. B) $M (1 + R^2)$. C) $M / (1 + R)^2$. D) $M / (1 + R^2)$.

Answer: A
Diff: 2
Section: 15.2

13) A certain magazine offers its subscribers the opportunity to "Buy Now and Save." If at the time their subscription renewal is due they agree to pay for 2 years rather than 1, the renewal price will be $50 per year rather than the usual $60 per year. At what interest rate will the consumer, who is certain she will subscribe to the magazine for the next 2 years, decide to "Buy Now and Save"?
A) any interest rate under 50 percent
B) any interest rate over 1.5 percent
C) any interest rate over 150 percent
D) any interest rate under 5 percent
E) She will always take this offer if she is absolutely certain to buy the magazine for another 2 years.

Answer: A
Diff: 2
Section: 15.2

Scenario 15.1:
This year Jacob Verytall signs a "Fifty Million Dollar" contract with the Mission City Muckrakers, a new basketball team. He will be paid $10 million per year over the next 5 years beginning next year. The interest rate is 10%, and the Muckrakers have enough in the bank to generate the payment stream.

14) Refer to Scenario 15.1. In terms of this year's dollars, this "Fifty Million Dollar" contract is worth approximately
A) $45.4 million.
B) $37.9 million.
C) $10 million.
D) $9.4 million.
E) $7.5 million.

Answer: B
Diff: 2
Section: 15.2

15) Refer to Scenario 15.1. If the interest rate falls,
A) the present value of this contract will fall.
B) the present value of this contract will be unaffected.
C) the present value of this contract will rise.
D) Jacob will be paid less than $10 million each year.
E) Jacob will be paid more than $10 million each year as he can invest the money.

Answer: C
Diff: 2
Section: 15.2

16) Refer to Scenario 15.1. If the interest rate is expected to fall to 5% in years 4 and 5, in terms of current dollars the value of the Muckrakers payments will
A) rise.
B) stay the same.
C) fall.
D) change, but we cannot answer this question without further information.

Answer: A
Diff: 2
Section: 15.2

Scenario 15.2:
Consider the payment streams listed below that are available from different capital projects for Furry Software. The firm must choose to implement just one out of the three possible projects.

	Today	1 Year	2 Years	3 Years
Retool Engineers' Offices	-$100	$500	$500	$500
Rewire Network	-$50	$1000	$500	$200
Move to Southern California	$-200	$300	$600	$1200

17) Refer to Scenario 15.2. With no other information available, it is
A) clear Furry should retool the offices.
B) clear Furry should rewire the network.
C) clear Furry should move to Southern California.
D) clear Furry should either retool the offices or rewire the network.
E) not possible to tell which payment stream is most valuable to Furry.

Answer: E
Diff: 1
Section: 15.2

18) Refer to Scenario 15.2. If the interest rate were 2%, Furry Software should
A) retool the offices.
B) rewire the network.
C) move to Southern California.
D) be indifferent between retooling and rewiring.
E) be indifferent between rewiring and moving.

Answer: C
Diff: 3
Section: 15.2

19) Refer to Scenario 15.2. If the interest rate were 20%, Furry Software should
A) retool the offices.
B) rewire the network.
C) move to Southern California.
D) be indifferent between retooling and rewiring.
E) be indifferent between retooling and moving.

Answer: B
Diff: 3
Section: 15.2

Scenario 15.3:
Consider the following information.

Melissa Qwerty was killed in a freak typewriter accident. Her family sued the typewriter company for the value of the income loss her death represented. The family demanded $X in compensation.

20) Refer to Scenario 15.3. $X would be higher if
A) her income were higher and she were younger.
B) her income were higher and she were older.
C) her income and the mortality rates for someone of Ms. Qwerty's statistical profile were both lower.
D) her income and the mortality rates for someone of Ms. Qwerty's statistical profile were both higher.
E) she were older and the relevant mortality rate were lower.

Answer: A
Diff: 2
Section: 15.2

21) Refer to Scenario 15.3. $X would be higher if Ms. Querty's
A) income and the interest rate were higher.
B) income and the interest rate were lower.
C) income were higher and the interest rate were lower.
D) income were lower and the interest rate were higher.
E) mortality rate and growth in income were lower.

Answer: C
Diff: 2
Section: 15.2

22) Refer to Scenario 15.3. Which of the following would raise $X?
A) Lower current income
B) Lower expected growth in income
C) Lower mortality rates
D) Lower interest rates
E) Higher age at time of death

Answer: D
Diff: 2
Section: 15.2

23) Suppose you are an attorney, and you are defending a client in a wrongful death suit. The deceased was a pilot for an aerial acrobatics team, and the opposing attorney has prepared an an estimate of the value of lost income that includes the mortality rate for all pilots. You should argue that the attorney's estimate of lost earnings is too _____ because the mortality rate for aerial acrobats is _____ than for other types of pilots.
A) low, lower B) low, higher C) high, lower D) high, higher

Answer: D
Diff: 1
Section: 15.2

24) Your uncle wants to help you with your college expenses, and he promised to pay you $10,000 next year and $15,000 in two years. The current interest rate is 6%, and you expect that this interest rate will be the same for the next year and will increase to 8% in the year after. What is the formula that you should use to compute the present discounted value of your uncle's contribution to your education expenses?

A) 0 + 10,000 + 15,000
B) 10,000/(1.06) + 15,000/((1.06)*(1.06))
C) 10,000/(1.06) + 15,000/((1.06)(1.08))
D) 10,000/(1.06) + 15,000/((1.08)(1.08))

Answer: C
Diff: 1
Section: 15.2

25) Two bonds of equal risk are for sale on the secondary bond market. The two bonds have the same face value, and both mature in 10 years. Bond A pays $10 per year and bond B pay $15 per year. Which bond will sell for a higher price?

A) Bond A
B) Bond B
C) They will sell for the same price.
D) The relative prices will depend on the expected interest rate over the next 10 years.

Answer: B
Diff: 1
Section: 15.3

26) A bond has a current market value of $800. The holder of the bond will receive a single payment of $1,000 one year from now. The interest rate is 10 percent. The effective yield on the bond is:

A) $200.
B) 10 percent.
C) 25 percent.
D) negative.
E) The yield cannot be determined with the information provided.

Answer: C
Diff: 2
Section: 15.3

27) As interest rates fall,

A) the values of bonds rise.
B) the values of bonds fall.
C) the values of bonds are unchanged.
D) the value of perpetuities are unchanged, but the value of other bonds change in value.
E) the value of all bonds except perpetuities change.

Answer: A
Diff: 1
Section: 15.3

28) The PDV of a perpetuity with a yearly payment of $500 at an interest rate of 5% is

A) $100.
B) $5,000.
C) $25,000.
D) $10,000.
E) $100,000.

Answer: D
Diff: 1
Section: 15.3

29) A perpetuity for sale at $100,000 that promises a yearly payment of $5000 has an effective yield of

A) 2%. B) 5%. C) 20%. D) 50%. E) 2000%.

Answer: B
Diff: 1
Section: 15.3

30) A perpetual payment of $10,000, offered for sale at $125,000, is being offered at an effective yield of

A) 8%. B) 9.2% C) 12.5%. D) 80%. E) 92%.

Answer: A
Diff: 1
Section: 15.3

31) If the payment stream of a bond remains the same and the price of the bond goes down, the

A) effective yield is unchanged.
B) effective yield rises.
C) effective yield decreases.
D) bond is reissued to reflect the higher interest rate.
E) bond is reissued to reflect the lower interest rate.

Answer: B
Diff: 2
Section: 15.3

32) If a coupon bond has a "face value" of $1000, it means that

A) the original purchaser paid $1000 for it.
B) each purchaser must pay $1000 for it.
C) it was purchased for at least $1000 and perhaps more.
D) the holder will be paid $1000 when the bond matures.
E) the holder will be paid $1000 plus accumulated interest when the bond matures.

Answer: D
Diff: 1
Section: 15.3

33) Use the following statements to answer this question:

I. The effective yield is generally easier to compute for a perpetuity than for a 10–year bond.
II. Two perpetuities that have the same annual payment must have the same price, even if the issuers of the bonds are different companies.

A) I and II are true. B) I is true and II is false.
C) II is true and I is false. D) I and II is false.

Answer: B
Diff: 2
Section: 15.3

34) Two corporations (TruBlu and FlyByNight) issue perpetuities that both pay $1,000 per year, but the market price of the FlyByNight bonds are much lower. The difference in the bond prices may reflect the belief that the bonds issued by FlyByNight are _____ risky when compared to the TruBlu bonds.

A) less
B) more
C) equally
D) none of the above

Answer: B
Diff: 1
Section: 15.3

35) The "NPV Criterion" is that a firm should invest in a new capital project if

A) the present value of the expected future cash flows is larger than the present value of the cost of the investment.
B) the future value of the expected future cash flows is larger than the cost of the investment.
C) financing can be secured on the basis of new bonds.
D) financing can be secured on the basis of new stocks.
E) financing is not necessary because there are enough liquid assets in the company's portfolio to afford the investment.

Answer: A
Diff: 1
Section: 15.4

36) The first term in an NPV calculation is usually

A) positive, because firms consider only positive returns.
B) positive, because interest charges do not accrue until the second period.
C) zero, because interest charges do not accrue until the second period.
D) negative, because funds for the project have to be borrowed up front before it is begun.
E) negative, because the cost of the project is immediate, but revenue streams from the project come later.

Answer: E
Diff: 1
Section: 15.4

37) The interest rate R in an NPV calculation should always

A) be the return that the firm could earn on a similar investment.
B) be the riskless interest rate (e.g., U.S. Treasury bills).
C) be the rate on corporate bonds.
D) be the rate of return available in the stock market.
E) be the interest rate at which the firm has to borrow.

Answer: A
Diff: 1
Section: 15.4

38) The real interest rate is
A) the nominal rate plus the rate of inflation.
B) the nominal rate minus the rate of inflation.
C) the nominal rate divided by the rate of inflation.
D) the nominal rate multiplied by the rate of inflation.
E) the nominal rate.

Answer: B
Diff: 1
Section: 15.4

39) If an individual has $10,000 in a savings account paying 3% and the inflation rate is 2%, the nominal interest rate is
A) 3% and the real rate is 5%.
B) 5% and the real rate is 7%.
C) 5% and the real rate is 3%.
D) 3% and the real rate is 1%.
E) 5%.

Answer: D
Diff: 1
Section: 15.4

40) If the inflation rate falls and nominal interest rates are unchanged,
A) inflation will fall.
B) inflation will continue at the same rate.
C) real interest rates rise.
D) real interest rates are unaffected.
E) real interest rates fall.

Answer: C
Diff: 1
Section: 15.4

41) The real discount rate and the nominal discount rate differ in their treatment of
A) risk. .
B) market return.
C) inflation.
D) expected risk.

Answer: C
Diff: 1
Section: 15.4

42) A $130,000 investment in new equipment this year will increase your firm's profits by $50,000 in each of the next 3 years. What is the net present value of this investment if your firm's opportunity cost of capital is 10 percent?
A) –5,657 B) 5,657 C) 124,343 D) 128,850

Answer: A
Diff: 2
Section: 15.4

43) You manage a new product development team for an electronics manufacturer, and your firm's policy is that all new projects must pay for themselves in the first five years. Your team has projected that the first year of the project requires an initial investment of $2 million with no revenue, the second year loss is $500,000, the net revenue for year 3 is zero, and you earn $1.8 million in both year 4 and year 5. If the opportunity cost of capital for your firm is 8%, should you go ahead with this project?
A) No, the expected NPV is negative
B) Yes, the expected NPV is roughly $290,000
C) Yes, the expected NPV is $1.1 million
D) We do not have enough information to answer this question.

Answer: B
Diff: 3
Section: 15.4

44) For net present value calculations, the rate of return that one could earn by investing in another project with similar risk is known as the:
A) real interest rate.
B) nominal interest rate.
C) prime interest rate.
D) opportunity cost of capital.

Answer: D
Diff: 1
Section: 15.4

45) Which kind of risk affects the opportunity cost of capital?
A) Nondiversifiable risk
B) Diversifiable risk
C) Both nondiversifiable and diversifiable risk
D) The risk inherent in "riskless" assets such as U.S. Treasury bills
E) The risk inherent in "riskless" portfolios such as broad stock market holdings

Answer: A
Diff: 1
Section: 15.5

46) A "risky" asset will earn a rate of return close to that of "riskless" assets if its risk is
A) nondiversifiable.
B) diversifiable.
C) nominal, as opposed to real.
D) related to the rate of inflation.
E) no greater than the risk of similar assets.

Answer: B
Diff: 1
Section: 15.5

47) Another name for diversifiable risk is
A) systematic risk.
B) nonsystematic risk.
C) nominal risk.
D) portfolio risk.
E) meta–portfolio risk.

Answer: B
Diff: 1
Section: 15.5

48) Which is the best example of a nondiversifiable risk for Stalwart Shoes?
A) A project to open a new store in Texas
B) A project to open a new factory in Texas
C) A project to move into the sock market
D) The state of the economy in Texas
E) The state of the U.S. economy

Answer: E
Diff: 2
Section: 15.5

49) Of the following endeavors of Happy Home Insurance Company of California, which involves the most nondiversifiable risk?
A) Fire insurance
B) Home burglary insurance
C) Earthquake insurance
D) Personal accident insurance
E) Home office insurance

Answer: C
Diff: 1
Section: 15.5

50) If a project's only risk is diversifiable,
A) only half the risk premium should be added to the discount rate.
B) only half the risk premium should be subtracted from the discount rate.
C) the risk premium should be added to the discount rate.
D) the risk premium should be subtracted from the discount rate.
E) no risk premium should be attached to the discount rate.

Answer: E
Diff: 1
Section: 15.5

51) The "Capital Asset Pricing Model" measures the risk premium for a capital investment by comparing the expected return on that investment with the
A) average return on other investments of similar risk.
B) average return on the past several years' investments made by the firm.
C) expected return on the entire stock market.
D) expected return on the government bond market.
E) expected return on the corporate bond market.

Answer: C
Diff: 1
Section: 15.5

52) If the rate of return on the stock market is r_m and the rate of return on a risk–free asset is r_f, then
A) $r_m - r_f$ measures the risk, all of it nondiversifiable, one has to accept in the stock market.
B) $r_m - r_f$ measures the risk, all of it diversifiable, one has to accept in the stock market.
C) $r_m + r_f$ measures the risk, all of it nondiversifiable, one has to accept in the stock market.
D) $r_m + r_f$ measures the risk, all of it diversifiable, one has to accept in the stock market.
E) r_m r_f measures the stock market's total risk.

Answer: A
Diff: 1
Section: 15.5

53) If an asset's beta is high, its
A) diversifiable risk and expected return are high.
B) nondiversifiable risk and expected return are high.
C) diversifiable risk is high; its expected return is low.
D) nondiversifiable risk is high; its expected return is low.
E) total risk is high; its return could be any amount.

Answer: B
Diff: 2
Section: 15.5

54) An asset's beta can be used to compute its discount rate for an NPV calculation because the discount rate is equal to
A) $r_f + b(r_m + r_f)$.
B) $r_f - b(r_m + r_f)$.
C) $r_f - b(r_m - r_f)$.
D) $r_f + b(r_m - r_f)$.
E) beta itself.

Answer: D
Diff: 1
Section: 15.5

55) The asset beta in the Capital Asset Pricing Model is a moderate number that measures
A) how sensitive the asset's return is to market movements.
B) how sensitive the asset's discount rate is to changes in inflation.
C) the risk premium on the stock market.
D) the risk premium on an individual stock.

Answer: A
Diff: 2
Section: 15.5

56) The higher the beta,
A) the smaller the diversifiable risk.
B) the smaller the nondiversifiable risk.
C) the larger the diversifiable risk.
D) the larger the nondiversifiable risk.

Answer: D
Diff: 2
Section: 15.5

57) Some universities now offer "tuition bonds." Parents can purchase a bond at the time their child is born. The bond is redeemable in 18 years for an amount of money equal to the cost of the university's tuition at that time. Which of the following would reduce the market price of these bonds?

A) An increase in the rate of interest
B) A decrease in the rate of interest
C) The passage of legislation limiting increases in college tuition to the rate of inflation
D) both A and C
E) both B and C

Answer: D
Diff: 3
Section: 15.5

58) The beta for General Motors (GM) is 0.5, the risk–free rate is 4%, and the market return is 9%. What is GM's risk–adjusted discount rate?

A) 4% B) 4.5% C) 6.5% D) 9%

Answer: C
Diff: 2
Section: 15.5

59) Use the following statements to answer this question:

I. The company cost of capital is identical to the risk–adjusted rate of return.
II. The company cost of capital does not depend on beta but does depend on the firm's interest rate on debt obligations.

A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: D
Diff: 2
Section: 15.5

60) The decision firms make about new capital projects is most like the decision consumers make when they decide

A) whether to take a new job.
B) which of two new jobs to take.
C) what brand of coffee to buy.
D) whether to buy a new house.
E) whether to go on vacation.

Answer: D
Diff: 1
Section: 15.6

61) In the consumer's NPV decision, the correct value for the interest rate R is
A) the interest rate that could be earned in a savings account when the consumer must borrow to finance the purchase.
B) the interest rate that would have to be paid on a loan when the consumer could pay for the purchase with funds in a savings account.
C) the interest rate charged for the loan when the consumer must borrow to finance the purchase.
D) the prime rate, irrespective of whether when the consumer must borrow to finance the purchase.
E) the prime rate plus the rate of inflation as measured by the CPI, irrespective of whether when the consumer must borrow to finance the purchase.

Answer: C
Diff: 1
Section: 15.6

62) Len is putting in a new swimming pool. He can either heat his pool with natural gas or with solar power. If he chooses solar power it will cost him more today, but he will recover these costs over the next 7 years in savings on his natural gas bill. The solar heater is expected to last 12 years. Len:
A) will put in the solar heater regardless of the discount rate because the savings in natural gas outweigh the initial cost of the solar heater.
B) is more likely to install the solar heater as the discount rate increases.
C) is more likely to install the solar heater as the discount rate declines.
D) will not put in the solar heater unless he is an environmentalist.

Answer: C
Diff: 2
Section: 15.6

Scenario 15.4:
Consider the following information:

You are considering buying a refrigerator. A new model would lower your electricity bills from $1200 per year to $1000 per year, because your current refrigerator is very inefficient. The refrigerator you want sells for $800, and you expect it to last for 10 years. The interest rate is 6%.

63) Refer to Scenario 15.4. The present value of the electricity bill savings you will receive over the next 10 years is
A) $200 times 10.
B) $200/1.06.
C) $200/$1.06^{10}$.
D) $200 $(1 + 1/1.06 + 1/1.06^2 + ... + 1/1.06^9)$.
E) $200 / $(1 + 1/1.06 + 1/1.06^2 + ... + 1/1.06^9)$.

Answer: D
Diff: 2
Section: 15.6

64) Refer to Scenario 15.4. The net present value of the purchase is
A) \$200 × 10 – \$800.
B) \$200/1.06 – \$800.
C) $\$200/1.06^{10} - \$800$.
D) $\$200 \times (1 + 1/1.06 + 1/1.06^2 + ... + 1/1.06^9) - \$800$.
E) $\$200 / (1 + 1/1.06 + 1/1.06^2 + ... + 1/1.06^9) - \$800$.

Answer: D
Diff: 2
Section: 15.6

Scenario 15.5:
Consider the following information based on a story by Hubert B. Herring that appeared in The New York Times on April 17, 1997:

Catherine has a two–pack–a–day cigarette habit. Cigarettes cost about \$2 per pack. Catherine is 20. On a \$250,000 life insurance policy, her annual premiums are \$1200; a non–smoker's would be \$500. Smokers earn from 4 to 8 percent less in income than non–smokers (lower productivity and more absence, among other things). In this case Catherine's income is expected to be \$20,500 per year over her lifetime whereas \$22,000 is an average non–smoker's salary. Let interest rates are expected to be 3%.

65) According to the information in Scenario 15.5, if Catherine's life expectancy is 80 as a non–smoker and no inflation is expected to occur throughout her life (so that cigarettes stay at \$2 per pack), then amount would she save by not buying cigarettes?
A) \$4 B) \$1460 C) \$29,200 D) \$87,600 E) \$116,800

Answer: D
Diff: 2
Section: 15.6

66) Refer to Scenario 15.5. What formula shows the present value of the amount Catherine would save on cigarette purchases over her lifetime?
A) \$4 times 365 times 60
B) $\$1460 (1 + 1/1.03 + 1/1.03^2 + 1/1.03^3 + ... + 1/1.03^{60})$
C) $\$1460 (1 + 1/1.03 + 1/1.03^2 + 1/1.03^3 + ... + 1/1.03^{80})$
D) $\$87,600 / (1 + 1.03 + 1.03^2 + ... + 1.03^{60})$
E) $\$87,600 / (1 + 1.03 + 1.03^2 + ... + 1.03^{80})$

Answer: B
Diff: 2
Section: 15.6

67) Refer to Scenario 15.5. If Catherine stopped smoking, then what is the total amount that Catherine will save on life insurance premiums over the rest of her expected lifespan?
A) \$700 B) \$14,000 C) \$30,000 D) \$42,000 E) \$56,000

Answer: D
Diff: 2
Section: 15.6

68) Refer to Scenario 15.5. What formula shows the present value of the amount Catherine would save on life insurance premiums over her lifetime by stopping smoking?
A) \$700 times 60
B) \$700 $(1 + 1/1.03 + 1/1.03^2 + 1/1.03^3 + ... + 1/1.03^{60})$
C) \$700 $(1 + 1/1.03 + 1/1.03^2 + 1/1.03^3 + ... + 1/1.03^{80})$
D) \$42,000 / $(1 + 1.03 + 1.03^2 + ... + 1.03^{60})$
E) \$42,000 / $(1 + 1.03 + 1.03^2 + ... + 1.03^{80})$

Answer: B
Diff: 2
Section: 15.6

69) Refer to Scenario 15.5. What is the total amount Catherine will lose in earnings by being a smoker, if she works now and continues until age 65?
A) \$1500 B) \$67,500 C) \$90,000 D) \$97,500 E) \$120,000

Answer: B
Diff: 2
Section: 15.6

70) Refer to Scenario 15.5. What formula shows the present value of the amount Catherine will lose in income over her working lifetime?
A) \$1500 × 60
B) \$1500 × $(1 + 1/1.03 + 1/1.03^2 + 1/1.03^3 + ... + 1/1.03^{45})$
C) \$1500 × $(1 + 1/1.03 + 1/1.03^2 + 1/1.03^3 + ... + 1/1.03^{65})$
D) \$67,500 / $(1 + 1.03 + 1.03^2 + ... + 1.03^{45})$
E) \$67,500 / $(1 + 1.03 + 1.03^2 + ... + 1.03^{65})$

Answer: B
Diff: 2
Section: 15.6

Scenario 15.6:
Consider the following decision that Eileen has to make:

Eileen is considering buying a \$4000 computer for her daughter. Eileen hopes that with the computer her daughter's schoolwork will improve so much that in two years time she will be offered a full–ride scholarship to college. The scholarship is paid for four years and is valued at \$25,000 per year. Even with the computer the probability that the scholarship will be awarded is 10%.

71) Refer to Scenario 15.6. What formula shows the dollar stream expected from this purchase?
A) –\$4000 + \$0 + \$25,000 + \$25,000 + \$25,000 + \$25,000
B) \$0 + \$25,000 + \$25,000 + \$25,000 + \$25,000
C) \$25,000 + \$25,000 + \$25,000 + \$25,000
D) –\$4000 + \$0 + \$2500 + \$2500 + \$2500 + \$2500
E) \$96,000

Answer: D
Diff: 2
Section: 15.6

72) Refer to Scenario 15.6. What formula shows the expected NPV of this purchase?
A) –$4000 + $2500(1/1.1^2 + 1/1.1^3 + 1/1.1^5 + 1/1.1^5)
B) –$4000 + $25,000(1/1.1^2 + 1/1.1^3 + 1/1.1^5 + 1/1.1^5)
C) –$4000 + (4 times $2500)
D) –$4000 + (4 times $25,000)
E) 4 * $2500

Answer: A
Diff: 2
Section: 15.6

73) Refer to Scenario 15.6. The expected NPV of the computer purchase is approximately
A) $3,200. B) $5000. C) $10,000. D) $68,000. E) $96,000.

Answer: A
Diff: 2
Section: 15.6

74) When purchasing autos and other durable goods, consumers tend to use discount rates that are inversely proportional to their income, so the discount rates are lower for consumers with higher income. The key reason for this behavior is that:
A) lower income consumers face very strict cash constraints, and they expect these problems to get worse in the future.
B) high income consumers tend to have lower opportunity costs for money.
C) high income consumers tend to make long–term investments (e.g., 30–year bonds), which always pay lower interest rates than short–term investments.
D) none of the above

Answer: B
Diff: 2
Section: 15.6

75) For an investment in a hybrid auto like the Toyota Prius, the car owner typically pays a higher initial price for the car but enjoys lower fuel costs for the life of the vehicle. The authors note that consumers tend to use discount rates that are too high when computing the net present value of these investment decisions. If this is true, consumers would tend to place too _____ emphasis on the initial purchase price and too _____ emphasis on the future fuel savings when computing the net present value of the investment.
A) much, much B) little, much C) much, little D) little, little

Answer: C
Diff: 1
Section: 15.6

76) Knowledge, skills, and experience that make an individual more productive and able to earn a higher income are known as:
A) mental capital. B) human capital.
C) sweat equity. D) intangible capital.

Answer: B
Diff: 1
Section: 15.7

77) Suppose you plan to retire in eight years, but your boss would like you to earn an online MBA in order to take on a new managerial position. The firm will continue to pay your salary while you are working through the online courses, and the new position pays an additional $15,000 per year. The online MBA tuition is $35,000 per year, and your discount rate is 5%. Should you complete the degree?

A) No, the net present value of the degree is negative.
B) Yes, the net present value of the degree is about $4,300
C) Yes, the net present value of the degree is about $20,000
D) We do not have enough information to answer this question.

Answer: B
Diff: 3
Section: 15.7

78) The authors note that an appropriate discount rate for most U.S. households is near 5%. However, suppose you are considering the decision to attend graduate school, and you already have large credit card balances from your undergraduate years. If you decide to use a higher discount rate (e.g., 10%) to reflect your higher opportunity cost of money, what impact does this change in the discount rate have on the net present value of a graduate degree?

A) Increases NPV
B) Decreases NPV
C) NPV would not change as long as we use nominal costs and returns.
D) NPV may increase or decrease, and we cannot determine the direction of change without more information.

Answer: B
Diff: 1
Section: 15.7

79) The authors cite a recent study of MBA programs that compares pre–MBA salaries with post–MBA salaries. For some of the highest ranked schools, the salary difference was roughly $100,000 per year, and the difference was roughly $60,000 for some schools ranked near the bottom of the top 20. Is it possible that the financial returns from an MBA earned at a lower ranked school may actually exceed the returns from a top ranked school?

A) Yes, the lower ranked schools may provide a higher net present value for the degree if their tuition is low enough.
B) Yes, but the potential gains depend on the discount rate and not the tuition.
C) No, the salary advantages of the top ranked schools always payoff in the long run.
D) We do not have enough information to answer the question.

Answer: A
Diff: 2
Section: 15.7

80) Suppose that many consumers tend to over–state the discount rate that should be used for computing the net present value of education, just as they do when making investments in durable goods like cars and appliances. What would happen if consumers (as a group) started to use lower discount rates when making decisions about their education?
A) NPV of a degree declines, demand for eduction declines
B) NPV of a degree declines, demand for education increases
C) NPV of a degree increases, demand for education declines
D) NPV of a degree increases, demand for education increases

Answer: D
Diff: 2
Section: 15.7

Scenario 15.7:
Consider the following information:

You move to northern California and buy a winery that already holds a stock of some wine in barrels. You are deciding whether to sell the wine now, or keep it until next year. The current price of wine is $20 per bottle, and it costs $2 per bottle to get the wine from barrels to bottles.

81) Based on the information in Scenario 15.7. You should
A) keep the wine in barrels.
B) sell the wine now, to get $18 per bottle in profit.
C) keep the wine unless you expect the price to fall below $18 per bottle.
D) keep the wine unless you expect the price to rise above $22 per bottle.
E) not do anything until you find out what the interest rate is.

Answer: E
Diff: 2
Section: 15.8

82) Based on the information in Scenario 15.7, if you expect the price to be $21 next year, you should
A) keep the wine in barrels until next year no matter what the interest rate.
B) keep the wine if interest rates are above 5%.
C) keep the wine if interest rates are below 5%.
D) sell the wine now.
E) do nothing until you know what the interest rate is going to be for the following year.

Answer: C
Diff: 3
Section: 15.8

83) What is the "Hotelling rule" for situations in which a producer can determine when a good is sold?
A) Price must rise at exactly the rate of interest.
B) Marginal cost must rise at exactly the rate of interest.
C) Price minus marginal cost must rise at exactly the rate of interest.
D) Price plus marginal cost must rise at exactly the rate of interest.
E) Price and marginal cost must be independent of the rate of interest.

Answer: C
Diff: 1
Section: 15.8

84) What is the "Hotelling rule" for a monopolist?
A) Price minus marginal cost must rise at exactly the rate of interest.
B) Price plus marginal cost must rise at exactly the rate of interest.
C) Marginal revenue minus marginal cost must rise at exactly the rate of interest.
D) Marginal revenue and marginal cost must be independent of the rate of interest.

Answer: C
Diff: 1
Section: 15.8

85) From the Hotelling rule, we would expect that a perfectly competitive industry selling an exhaustible resource would
A) sell more of it than a monopolist would in each period.
B) sell it all at once.
C) sell less of it than a monopolist would in each period.
D) not sell it.
E) not sell it unless interest rates were low.

Answer: A
Diff: 1
Section: 15.8

86) The user cost of an exhaustible resource is
A) the same as its price.
B) the same as its production cost.
C) the opportunity cost of using the resource today rather than saving it for the future.
D) the amount of the resource that is extracted today.
E) not related to the amount of the resource that exists.

Answer: C
Diff: 1
Section: 15.8

87) As the stock of a depletable resource falls, its user cost
A) rises.
B) falls.
C) is unchanged, but its price rises.
D) is unchanged, but the extraction cost rises.
E) is unchanged, but its true cost rises.

Answer: A
Diff: 1
Section: 15.8

88) Over the long term, the ultimate determinant of the price of a depletable resource is the
A) extraction cost.
B) user cost.
C) demand.
D) availability of substitutes.
E) cost of finding new reserves.

Answer: B
Diff: 1
Section: 15.8

89) You are the owner of a rare bottle of wine valued at $332. There are no costs associated with storing or selling the wine. Next year you expect the wine to increase in value to $350. If the interest rate is 10 percent
A) you should sell the wine today.
B) you should keep the wine for at least one more year.
C) you are indifferent between selling the wine today and holding it for one more year.
D) more information is needed to answer this question.

Answer: A
Diff: 3
Section: 15.8

90) According to the economics of exhaustible resources, if the interest rate increases,
A) an exhaustible resource will be used up sooner.
B) an exhaustible resource will be used up over a longer period of time.
C) the period of time until an exhaustible resource is used up will not change.
D) none of the above

Answer: A
Diff: 3
Section: 15.8

91) Suppose new oil reserves are discovered that were not previously known. What happens to the user cost of oil?
A) Decreases
B) Increases
C) Remains the same
D) May increase or decrease, depending on the discount rate

Answer: A
Diff: 2
Section: 15.8

92) Relative to a perfectly competitive market for an exhaustible resource, the monopolist charges a _____ price and uses the resource more _____.
A) lower, slowly
B) lower, quickly
C) higher, slowly
D) higher, quickly

Answer: C
Diff: 1
Section: 15.8

93) Interest rates are determined by the supply and demand for
A) money.
B) capital goods.
C) loanable funds.
D) foreign currencies.
E) stocks.

Answer: C
Diff: 1
Section: 15.9

94) The demand for loanable funds slopes
A) downward because NPV falls as interest rates fall.
B) downward because NPV falls as interest rates rise.
C) downward because NPV falls as money enters the economy.
D) upward because at higher interest rates people are more willing to save.
E) upward because at higher interest rates the stock market is a less attractive investment.

Answer: B
Diff: 1
Section: 15.9

95) As firms' expected profit from new capital projects falls,
A) the supply of loanable funds will shift rightward.
B) the supply of loanable funds will shift leftward.
C) the demand for loanable funds will shift rightward.
D) the demand for loanable funds will shift leftward.
E) projects must become more profitable

Answer: D
Diff: 1
Section: 15.9

96) When the government runs a large deficit,
A) the supply of loanable funds will shift rightward.
B) the supply of loanable funds will shift leftward.
C) the demand for loanable funds will shift rightward.
D) the demand for loanable funds will shift leftward.
E) taxes must rise.

Answer: C
Diff: 1
Section: 15.9

97) If individuals decide to save more for retirement,
A) the supply of loanable funds will shift rightward.
B) the supply of loanable funds will shift leftward.
C) the demand for loanable funds will shift rightward.
D) the demand for loanable funds will shift leftward.
E) an excess supply of loanable funds emerges and persists.

Answer: A
Diff: 1
Section: 15.9

98) If individuals start paying off the large amount of credit card debt they now hold,
A) the supply of loanable funds will shift rightward.
B) the supply of loanable funds will shift leftward.
C) the demand for loanable funds will shift rightward.
D) the demand for loanable funds will shift leftward.
E) an excess demand for loanable funds emerges and persists.

Answer: D
Diff: 1
Section: 15.9

99) If technological breakthroughs in the computer and software industries cause large numbers of firms to consider investment projects they hadn't previously thought of,
A) the supply of loanable funds will shift rightward.
B) the supply of loanable funds will shift leftward.
C) the demand for loanable funds will shift rightward.
D) the demand for loanable funds will shift leftward.
E) an excess demand for loanable funds emerges and persists.

Answer: C
Diff: 1
Section: 15.9

100) If individuals are convinced that the government will take care of all their medical needs after they retire, then
A) the supply of loanable funds will shift rightward.
B) the supply of loanable funds will shift leftward.
C) the demand for loanable funds will shift rightward.
D) the demand for loanable funds will shift leftward.

Answer: B
Diff: 2
Section: 15.9

101) If the U.S. government retires the national debt, then
A) a shift in the demand of loanable funds will cause interest rates to rise.
B) a shift in the demand of loanable funds will cause interest rates to fall.
C) a shift in the supply for loanable funds will cause interest rates to rise.
D) a shift in the supply for loanable funds will cause interest rates to fall.
E) there will be an excess supply for loanable funds.

Answer: B
Diff: 1
Section: 15.9

102) If average Americans start to pay off the huge credit card debt they now hold, then
A) a shift in the supply of loanable funds will cause interest rates to rise.
B) a shift in the supply of loanable funds will cause interest rates to fall.
C) a shift in the demand for loanable funds will cause interest rates to rise.
D) a shift in the demand for loanable funds will cause interest rates to fall.
E) there will be an excess demand for loanable funds.

Answer: D
Diff: 2
Section: 15.9

103) If technological breakthroughs in the internet cause large numbers of firms to consider investment projects they hadn't previously thought of, then
A) a shift in the supply of loanable funds will cause interest rates to rise.
B) a shift in the supply of loanable funds will cause interest rates to fall.
C) a shift in the demand for loanable funds will cause interest rates to rise.
D) a shift in the demand for loanable funds will cause interest rates to fall.
E) there will be an excess supply of loanable funds.

Answer: C
Diff: 2
Section: 15.9

104) If we start to think that Medicare will pay for all of our medical needs as we age, then our likely actions will lead to:
A) a shift in the supply of loanable funds will cause interest rates to rise.
B) a shift in the supply of loanable funds will cause interest rates to fall.
C) a shift in the demand for loanable funds will cause interest rates to rise.
D) a shift in the demand for loanable funds will cause interest rates to fall.
E) there will be an excess supply of loanable funds.

Answer: A
Diff: 2
Section: 15.9

105) The difference between a Treasury bill and a Treasury bond is that the bill
A) can be purchased by anyone, and the bond can be purchased by U.S. citizens only.
B) is insured, and the bond is not.
C) pays more than the bond.
D) pays no interest.
E) is short–term, and the bond is long–term.

Answer: E
Diff: 1
Section: 15.9

106) Which of the following is NOT true about commercial paper?
A) It is a short–term (six months or less) debt.
B) It is riskier than a Treasury bill.
C) It is issued by a "high–quality" corporate borrower.
D) It pays at a rate about double the Treasury bill.
E) It can be resold.

Answer: D
Diff: 1
Section: 15.9

107) The prime rate
A) is charged by high quality corporations to each other.
B) is charged by banks to each other.
C) is charged by the Federal Reserve to member banks.
D) is charged by banks to high quality corporations.
E) fluctuates on a day–to–day basis as do other rates.

Answer: D
Diff: 1
Section: 15.9

108) Use the following statements to answer this question:
I. Corporate paper rates are typically less than one percent higher than Treasury bill rates.
II. Treasury bill rates may be viewed a short–term, risk–free rates.
A) I and II are true.
B) I is true and II is false
C) II is true and I is false
D) I and II are false

Answer: A
Diff: 1
Section: 15.9

109) What is the difference between the corporate paper rate and the corporate bond rate?

A) The corporate paper rate refers to interest rates paid on high–quality corporate bonds of relatively short duration (up to 6 months).

B) The corporate paper rate refers to interest rates paid on high–quality corporate bonds of relatively long duration (typically 20 years).

C) The corporate bond rate refers to interest rates paid on long–term (typically 20 year) corporate bonds that may represent varying quality or risk.

D) A and B are correct.

E) A and C are correct.

Answer: E
Diff: 2
Section: 15.9

110) Your 65–year–old father is going to retire next year. He would like to have an income of $20,000 per year for the remainder of his life. If he is expected to live for ten more years, write an algebraic expression to indicate the amount of money he needs today to pay him this sum of money if the interest rate is 10 percent.

Answer: PDV = (20,000/1.1) + (20,000/1.1^2) + ... + (20, 000/1. 1^{10})
Diff: 1
Section: 15.2

111) You have won a contest and are allowed to choose between two prizes. One prize is $200 today and another $200 one year from now. The other prize is $100 today and an additional $325 one year from now. At what interest rate (if any) would you be indifferent between the two prizes?

Answer: Prize 1 has PDV = 200 + [200/(I + R)]
Prize 2 has PDV = 100 + [365/(I + R)]
Equating the PDV for prize 1 and prize 2 and solving for R yields:
200 + [200/(l + R)] = 100 + [365/(l + R)]
R = 0.25

Diff: 2
Section: 15.2

112) What is the relationship between interest rates and bond prices? Explain.

Answer: There is an inverse relationship between bond prices and interest rates. A bond pays a fixed sum of money each year during its life. At a higher interest rate, the present value of the future payments declines, reducing the value of the bond.

Diff: 2
Section: 15.3

113) You have been hired by an attorney to perform an economic analysis of lost wages in a wrongful death suit. The case involves an insurance agent, John Doe, who was killed in an auto accident a few days after his 59th birthday. Mr. Doe could have expected to earn $75,000 this year. Data suggest that the income of insurance agents has risen an average of 6% over the past 20 years. Mr. Doe's expected retirement age was 65, i.e., on his 65th birthday. Available data provide the mortality rates given below for individuals of Mr. Doe's sex and occupation at various ages. Ten percent appears to be the appropriate discount rate.

Age	Mortality Rate
59	0.06
60	0.075
61	0.09
62	0.10
63	0.12
64	0.15
65	0.16

a. Calculate the present discounted value of Mr. Doe's expected earnings stream. (For simplicity, assume he receives all of his earnings for the preceding year on his birthday.)
b. The attorney has asked your advice regarding a minimum figure that should be accepted as an out–of–court settlement. What guidance can you give the attorney? Would additional information allow you to give the attorney a more precise estimate of the figure that should be accepted? Give an example of how more information would help.
c. You must be prepared for cross–examination by the defendant's attorney. Where would you expect the opposing attorney to attack your testimony?

Answer: ***a.***

Age	$W_0(1 + g)^t$	$(1–M_t)$	$(1+R)^t$	$\frac{W_0(1 + g)^t(1 - M^t)}{(1 + R)^t}$
60	79,500	0.925	1.100000	66,852.27
61	84,270	0.91	1.210000	63,376.61
62	89,326.20	0.90	1.330000	60,466.30
63	94,685.77	0.88	1.464100	56,911.06
64	100,366.92	0.85	1.611051	52,954.18
65	106,388.93	0.84	1.771561	50,445.17

b.
The attorney would be foolish to insist upon $350,985.59, since there is some uncertainty regarding the outcome of the case. Clearly, it is appropriate to accept a somewhat smaller settlement. How much smaller would depend upon the probability of winning the case. If the attorney assigned a 0.9 probability of winning the case with the full settlement, the appropriate offer would be 0.9 times the estimated loss.

$$0.9 \times 350{,}985.59 = 315{,}887.03$$

Obviously, as the probability of winning falls, the out–of–court settlement falls with it.

c.
The defendant's attorney could be expected to attack the validity of the assumptions that have been made in preparing the estimated lost income. Assuming that the mortality figures come from an objective source, there are two main assumptions contained in the report. We must make an assumption regarding growth in Mr. Doe's

earnings, and we must also make an assumption for the interest rate. The defendant's attorney could be expected to argue for a lower growth in earnings and a higher discount rate.

Diff: 3
Section: 15.3

114) The Clemson Manufacturing Corp. engineers have estimated that a new factory can be constructed for the manufacture of hydraulic valves and fittings. Two different technologies, A and B, have been considered in the manufacturing process. The costs of the factory and annual earnings are given below for both technologies.

	Capital Costs (in $millions)		Earnings (in $millions)	
End of the Year	A	B	A	B
0	$10	$15	$0	$0
1	10	10	–1	0
2	10	0	1	2
3	0	0	5	10
4	0	0	10	10
5	0	0	20	10

At the end of five years, technology A will have a scrap value of one million dollars, and technology B will have a scrap value of 5 million dollars. Assume that these two projects are equally risky and the appropriate discount rate is 10 percent per year. Calculate the net present value of each of these factories. Determine if either or both would be feasible. Does it matter whether or not real or nominal terms are used for capital costs, cash flows, and discount rate? Explain.

Answer: Technology A (expressed in terms of millions of dollars)

$$NPV_A = -10 - \frac{10}{(1.10)^1} - \frac{10}{(1.10)^2} - \frac{1}{(1.10)^1} + \frac{1}{(1.10)^2} + \frac{5}{(1.10)^3} + \frac{10}{(1.10)^4} + \frac{20}{(1.10)^5} + \frac{1}{(1.10)^5}$$

$$= -28.260 + 25.27$$

$$= -2.99$$

Technology B (expressed in terms of millions of dollars)

$$NPV_B = -15 - \frac{10}{(1.10)^1} + \frac{2}{(1.10)^2} + \frac{10}{(1.10)^3} + \frac{10}{(1.10)^4} + \frac{20}{(1.10)^5} + \frac{1}{(1.10)^5}$$

$$= 4.94$$

Technology B produces a positive NPV, and so is the project of choice.

It does not matter whether real or nominal values are used for capital outlay, cash flow, or discount rate. Consistency only matters. All units should be in either real or nominal terms.

Diff: 2
Section: 15.4

115) You have been offered the opportunity to purchase a bond that will pay $100 in interest at the end of each of the next three years, and a $1000 repayment of principal at the end of the third year. The current interest rate is 12%.

a. Calculate the selling price of the bond. (You may assume that 12% accurately reflects the risk of the bond.)
b. What would happen to the selling price of the bond if interest rates should fall?

Answer: ***a.***

Selling price will be:

$$\frac{100}{(1+0.12)^1}+\frac{100}{(1+0.12)^2}+\frac{100}{(1+0.12)^3}+\frac{100}{(1+0.12)^4}=951.96$$

b.

The selling price of the bond will rise.

Diff: 2
Section: 15.4

116) The Vortex Corp. has an opportunity to invest $1,500,000 in investment A or in investment B. Investment A promises to pay $500,000 profit at the end of the first year, $550,000 at the end of two years, $600,000 at the end of three years, and $625,000 at the end of four years. Investment B promises to pay $25,000 profit at the end of the first year, $100,000 at the end of two years, $600,000 at the end of the third year, and $1,000,000 at the end of four years. Assume that nine percent per year is an appropriate discount rate for each investment. Also, assume a zero scrap value for each investment at the end of four years. Determine which investment promises to be the better of the two for the company.

Answer: For each investment we need to calculate the NPV.

$$NPV_{investment}=-C+\frac{\pi_1}{(1+R)^1}+\frac{\pi_2}{(1+R)^2}+\frac{\pi_3}{(1+R)^3}\ldots\frac{\pi_n}{(1+R)^n}$$

For investment A:

$$\begin{aligned}NPV_A &= -C+\frac{\pi_1}{(1+R)^1}+\frac{\pi_2}{(1+R)^2}+\frac{\pi_3}{(1+R)^3}\ldots\frac{\pi_n}{(1+R)^4}\\ &= -1{,}500{,}000+\frac{500{,}000}{(1+0.09)^1}+\frac{550{,}000}{(1+0.09)^2}+\frac{600{,}000}{(1+0.09)^3}+\frac{625{,}000}{(1+0.09)^4}\\ &= -1{,}500{,}000+458{,}716+462{,}924+463{,}310+442{,}766\\ &= \$327{,}716\end{aligned}$$

For investment B:

$$\begin{aligned}NPV_B &= -1{,}500{,}000+\frac{25{,}000}{(1+0.09)^1}+\frac{100{,}000}{(1+0.09)^2}+\frac{600{,}000}{(1+0.09)^3}+\frac{1{,}000{,}000}{(1+0.09)^4}\\ &= -1{,}500{,}000+22{,}936+84{,}168+463{,}310+708{,}425\\ &= \$221{,}161\end{aligned}$$

Thus, investment B should not be undertaken. The company should invest in A.

Diff: 2
Section: 15.4

117) Thompson Industries produces packaging materials. Thompson is considering undertaking one or both of two investment projects. The first investment involves a new automated warehouse for the firm's foam and plastic inventory. The warehouse can be expected to have a useful life of ten years, after which it will be obsolete with no scrap value. The warehouse involves $3,000,000 in capital cost that must be paid immediately. The warehouse will lower the firm's cost $400,000 for each of the first five years, and $500,000 per year thereafter. The second project involves the acquisition of a computerized order system that would allow the firm's salespeople to link directly with the computer to place orders. The computerized network will require an initial capital cost of $1,000,000, but will save the firm $300,000 per year in support staff costs. Thompson's managers believe that the order system will be obsolete after five years. Cash flows for each project will be at year end. Thompson uses a 10% discount rate in evaluating the investment projects. interest rates and future cash flows are in real terms, net of all tax effects.

a. Calculate the net present value of each investment project. Which project(s) should the firm accept?
b. Comment on the impact of a change in the discount rate on the NPV. (Analyze both an increase and a decrease in the NPV.)

Answer: ***a.***

$$NPV_{investment} = -C + \frac{\pi_1}{(1+R)^1} + \frac{\pi_2}{(1+R)^2} + \frac{\pi_3}{(1+R)^3} \ldots \frac{\pi_n}{(1+R)^n}$$

For the warehouse:

$$\begin{aligned} NPV_{warehouse} &= -3{,}000{,}000 + \frac{400{,}000}{(1+0.10)^1} + \frac{400{,}000}{(1+0.10)^2} + \frac{400{,}000}{(1+0.10)^3} + \frac{400{,}000}{(1+0.10)^4} \\ &\quad + \frac{400{,}000}{(1+0.10)^5} + \frac{500{,}000}{(1+0.10)^6} + \frac{500{,}000}{(1+0.10)^7} + \frac{500{,}000}{(1+0.10)^8} \\ &\quad + \frac{500{,}000}{(1+0.10)^9} + \frac{500{,}000}{(1+0.10)^{10}} \\ &= -3{,}000{,}000 + 2{,}693{,}204.88 \\ &= -306{,}795.12 \end{aligned}$$

Given that the NPV< 0, the project should not be accepted.
For the computerized order system:

$$\begin{aligned} NPV_{computer\ system} &= -1{,}000{,}000 + \frac{300{,}000}{(1+0.10)^1} + \frac{300{,}000}{(1+0.10)^2} + \frac{300{,}000}{(1+0.10)^3} + \frac{300{,}000}{(1+0.10)^4} + \frac{400{,}000}{(1+0.10)^5} \\ &= -1{,}000{,}000 + 1{,}137{,}236.03 \\ &= 137{,}236.03 \end{aligned}$$

Given that the NPV> 0, the project should be accepted.

b.
Raising the discount rate lowers the NPV, lowering the discount rate raises the NPV.

Diff: 2
Section: 15.4

118) The Ampex Co. manufactures plastic fixtures for residential bathrooms. Currently, it has an opportunity to invest $1,000,000 in the equipment needed to produce other plastic fixtures for kitchen use. If the company decides to sell kitchen fixtures, it has reason to believe that it can generate the following profit stream during a six–year life cycle for kitchen fixtures.

End of Year	Profit
1	$ 10,000
2	100,000
3	500,000
4	600,000
5	400,000
6	200,000

At the end of six years, the company can sell the capital used to make kitchen fixtures for $50,000. If the interest rate on money available to Ampex is 11% per year, should it invest in kitchen fixtures? Does it matter if the 11% per year is in nominal or real terms? Explain.

Answer: Calculate the NPV for kitchen fixture operation.

$$\begin{aligned}\text{NPV}_{\text{kitchen fixtures}} &= -1{,}100{,}000 + \frac{10{,}000}{(1.11)^1} + \frac{100{,}000}{(1.11)^2} + \frac{500{,}000}{(1.11)^3} + \frac{600{,}000}{(1.11)^4} \\ &\quad + \frac{400{,}000}{(1.11)^5} + \frac{200{,}000}{(1.11)^6} + \frac{50{,}000}{(1.11)^6} \\ &= -1{,}100{,}000 + 1{,}222{,}047 \\ &= 122{,}047\end{aligned}$$

Thus, since the NPV is greater than zero, the firm should invest in kitchen fixtures.

It does not matter whether the discount rate is in nominal or real terms. What does matter is that cash flows and discount rate be expressed in the same terms. Use either nominal for both or use real for both.

Diff: 2
Section: 15.4

119) The Ampex Corp. manufactures brass fittings for the plumbing industry. It has an opportunity to produce and sell brass components for residential electric fixtures. If it does produce components for electrical fixtures, it will have to spend $500,000 initially. It expects to get a nominal net cash flow of $200,000 in each of the five years life of the project. If the real interest rate is 8 percent per year and the inflation rate is 4 percent per year, what will the NPV of the project be?

Answer: Convert all components to nominal values. In this case, only the interest rate needs to be converted since net cash flows are already in nominal terms.

$$\begin{aligned}\text{NPV}_{\text{electrical fixtures}} &= -500{,}000 + \frac{200{,}000}{(1.12)^1} + \frac{200{,}000}{(1.12)^2} + \frac{200{,}000}{(1.12)^3} + \frac{200{,}000}{(1.12)^4} + \frac{200{,}000}{(1.12)^5} \\ &= -500{,}000 + 720{,}955 \\ &= 220{,}955\end{aligned}$$

Diff: 2
Section: 15.4

120) You have been given an opportunity to invest in a stock. Recent trends suggest that a one percent rise in the stock market leads to approximately a two and one–half percent rise in the price of this stock. The real risk–free rate currently stands at 6% and stocks on average have provided 12% returns. Using the capital asset pricing model, determine the appropriate discount rate for the stock in question.

Answer: Discount rate $= r_f + \beta\left(r_m - r_f\right)$

$\beta = 2.5$

$R = 6 + 2.5(12 - 6)$

$R = 6 + 15$

$= 21\%$

Diff: 3
Section: 15.5

121) Assume that you own an exhaustible resource that is sold competitively. The price of the resource is:

$$P_{t+1} - C = 1.08(P_t - C),$$

where t = 0 at the beginning of 2005, P = price in dollars per ton, and C = marginal cost of extraction (fixed over time). It is also known that the demand for the resource is:

$$Q = 1{,}000{,}000 - 25{,}000\,P,$$

where Q represents output in tons per year. If the beginning of 2005 price is $30 per ton and the marginal cost of extraction is $10 per ton, what will the price be at the end of 2009? What is the user cost of production in 2009? Is it different from the user cost for 2005? Explain. How much of the resource will be extracted in 2009? What is the market rate of interest on money? Explain.

Answer: The price at the end of 2009 will be determined from equation (1).

time(t)		Net Price
beginning	0	30 – 10 = 20
end of 2005	1	P_1 – 10 = 21.600
end of 2006	2	P_2 – 10 = 23.328
end of 2007	3	P_3 – 10 = 25.194
end of 2008	4	P_4 – 10 = 27.210
end of 2009	5	P_5– 10 = 29.390

Thus, the end of 2009 price is P. = 23.39 + 10 = $39.39/ton. The user cost is the difference between the selling price of 39.39 and the marginal cost of extraction of 10.000 or 29.39/ton. This user price is higher in 2009 than in 2005 reflecting the fact that more of the resource has been extracted by 2009 than by 2005, and the value of each remaining unit has risen.

At the price of $39.39 per ton, the quantity extracted in 2009 is:

$$Q = 1{,}000{,}000 - 25{,}000(39.39) = 15{,}250 \text{ tons/year}$$

The market rate of interest on money is the same rate as the rate at which $P_t - C$ increases each year. In this problem, 1 + R = 1.08; therefore, R = 0.08 or 8 percent per year.

Diff: 3
Section: 15.8

122) The demand for xenite ore is fixed over time and is given as:

$q = 40 - P$

where q is the number to tons of ore produced and P is the price per ton of xenite ore. The marginal extraction cost is $15 per ton and is also constant over time. The total quantity of the resource currently known to exist is 53.29 tons. The interest rate is 10 percent. Using the Hotelling rule for an exhaustible resource, complete the following table.

Time Period	Price	Marginal Cost	q	Cumulative Production
Today		15		
1 Year		15		
2 Years		15		
3 Years		15		
4 Years		15		
5 Years		15		
6 Years		15		
7 Years	40.00	15	0	53.29

Answer:

Time Period	Price	Marginal Cost	q	Cumulative Production
Today	27.83	15	12.17	12.17
1 Year	29.11	15	10.89	23.06
2 Years	30.52	15	9.48	32.54
3 Years	32.08	15	7.92	40.46
4 Years	33.78	15	6.22	46.68
5 Years	35.66	15	4.34	51.02
6 Years	37.73	15	2.27	53.29
7 Years	40.00	15	0.00	53.29

Diff: 2
Section: 15.8

123) A U.S. manufacturer of particle board furniture is considering investing in a new stamping machine. The machine is expected to have a useful life of five years, after which the machine can be sold as scrap for an estimated $5000. The firm plans to issue bonds to pay for the machine and intends to treat the interest rate on the bonds as the relevant discount rate for evaluating the project. The machine will cost the firm $175,000, all of which must be paid at the beginning of the project. The new stamping machine will reduce costs $50,000 per year, for each year of the machine's life. The firm treats all of the cost savings as if they occur at year end. Should the firm plan to undertake the investment project, bonds will be issued in approximately three months. The firm has estimated the supply and demand for loanable funds given by these equations:

$L_D = 25{,}000{,}000 - 125{,}000{,}000\ R$

$L_S = 2{,}500{,}000 + 62{,}500{,}000\ R$

a. Given the information above, should the firm undertake the investment in the stamping machine? Support your answer using numbers.
b. Assume that the demand for loanable funds shifts the demand curve upward by 3,750,000 (i.e., 3,750,000 more demand at every interest rate). What impact will the increase in demand have on the interest rate and on the firm's stamping machine project? (Assume that the firm learns of this change in demand before accepting the project.)

Answer: ***a.***

The first step is to determine the interest rate.

$L_D = 25{,}000{,}000 - 125{,}000{,}000R$

$L_S = 2{,}500{,}000 + 62{,}500{,}000R$

Equating L_D to L_S:

$25{,}000{,}000 - 125{,}000{,}000R = 2{,}500{,}000 + 62{,}500{,}000R$

$22{,}500{,}000 = 187{,}500{,}000R$

$R = 0.12$

NPV of project

$$NPV = -175{,}000 + \frac{50{,}000}{(1.12)^1} + \frac{50{,}000}{(1.12)^2} + \frac{50{,}000}{(1.12)^3} + \frac{50{,}000}{(1.12)^4} + \frac{50{,}000}{(1.12)^5}$$

$NPV = -175{,}000 + 180{,}238.81$

$NPV = 5{,}238.81$

NPV > 0; accept project

b.

New demand curve would become

$L_D = 28{,}750{,}000 - 125{,}000{,}000R$

Equating L_D to L_S:

$28{,}750{,}000 - 125{,}000{,}000R = 2{,}500{,}000 + 62{,}500{,}000R$

$26{,}250{,}000 = 187{,}500{,}000R$

$R = 0.14$

NPV of project at R = 0.14

$$NPV = -175{,}000 + \frac{50{,}000}{(1.14)^1} + \frac{50{,}000}{(1.14)^2} + \frac{50{,}000}{(1.14)^3} + \frac{50{,}000}{(1.14)^4} + \frac{50{,}000}{(1.14)^5}$$

$NPV = -175{,}000 + 171{,}654.05$

$NPV = -3{,}345.95$

NPV < 0; reject project

Diff: 2
Section: 15.9

124) David Adams purchased an art collection for $100,000 five years ago. He recently learned that art collections similar to his have been growing in value at an annual rate of 12% per year.

a. Determine the value of David's art collection during each of the past five years.
b. David has access to an economic consulting model that forecasts the supply and demand curves for loanable funds to be:

$L_D = 18{,}000{,}000 - 100{,}000{,}000R$

$L_S = -4{,}000{,}000 + 120{,}000{,}000R.$

The consultant believes that the supply and demand curves will remain fixed over the next two years. Assuming that David's only objective is wealth maximization, should David sell his art collection? Explain your answer in detail. (Assume that the growth rate of the art collection remains constant.)

Answer: ***a.***

To find value of art collection in any year, multiply beginning value V_0 by one plus the growth rate to the t power.

$V_t = V_0(1 + g)^t$

V_1 = end of year one, V_2 = end of year 2, etc. (Recall $V_0 = 100{,}000.00$).

$V_1 = 100{,}000(1 + 0.12)^1 = \$112{,}000.00$

$V_2 = 100{,}000(1 + 0.12)^2 = \$125{,}440.00$

$V_3 = 100{,}000(1 + 0.12)^3 = \$140{,}492.80$

$V_4 = 100{,}000(1 + 0.12)^4 = \$157{,}351.94$

$V_5 = 100{,}000(1 + 0.12)^5 = \$176{,}234.17$

At the end of five years the collection should be worth
$176,234.17.

b.

Equate L_D to L_S to determine the interest rate.

$18{,}000{,}000 - 100{,}000{,}000R = -4{,}000{,}000 + 120{,}000{,}000R$

$R = 0.10$

David should hold onto the art collection which is growing at 12 percent per year rather than earn 10 percent interest.

Diff: 2
Section: 15.9

125) Your aunt owns a business that will provide cash flows of $10,000 each year for the next 3 years. If the appropriate discount rate is 10%, what is the present value of the business? What is the minimum price your aunt should accept for the business?

Answer: The present value of the business cash flows is:

$$PV = \frac{10{,}000}{1.1} + \frac{10{,}000}{1.1^2} + \frac{10{,}000}{1.1^3} = 24{,}868.519.$$

Your aunt should not accept any price below $24,868.519.

Diff: 1
Section: 15.9

126) Your aunt has offered to give you $1,000 annually for the next 2 years or $3,000 at the end of 2 years. What must be the appropriate discount rate if you are indifferent between the two payment schemes?

Answer: To make you indifferent between the two payment schemes, the present values of the payment schemes must be equal. That is,
$\frac{1,000}{1+r} + \frac{1,000}{(1+r)^2} = \frac{3,000}{(1+r)^2} \Leftrightarrow 1,000(1+r) + 1,000 = 3,000 \Leftrightarrow r = 1$. The discount rate must be 100% before you are indifferent between the two payment schemes. If the discount rate is below 100%, the payment scheme given $3,000 at the end of 2 years offers the highest present value.

Diff: 2
Section: 15.9

127) Nancy is considering forming a 5 year business partnership with Claudia. Nancy believes her portion of the partnership will generate the following profits:

Year	Profits	Present Value
1	$2,000	
2	$4,000	
3	$12,000	
4	$15,000	
5	$18,000	

Nancy's appropriate discount rate is 6%. To join the partnership, Nancy needs to invest $30,000. Does the partnership offer a rate of return in excess of 6%?

Answer: As the table below indicates, the present value of the partnership is in excess of the $30,000 investment. This implies the partnership offers a rate of return greater than 6%. In this case, Nancy should join the partnership.

Year	Profits	Present Value
1	$2,000	1,886.79
2	$4,000	3,559.99
3	$12,000	10,075.43
4	$15,000	11,881.41
5	$18,000	13,450.65
TOTAL		$40,854.27

Diff: 2
Section: 15.9

128) Sam has just entered college, and he is considering two options. He can get a part–time job after classes and during breaks to pay his college expenses or he can take out student loans and keep an active social life. While in school, his school loans due not accrue interest. If he doesn't work, he must borrow $10,000 per year for four years. If he works, he just does pay all his college expenses. If his appropriate discount rate is 10%, what is the present value of his school loan debt after 4 years?

Answer: Sam's present value of his loan debt is: $PV = \frac{\$40{,}000}{1.1^4} = \$27{,}320.538.$

Diff: 2
Section: 15.9

129) XYZ corporation will pay the $1,000 face value on their outstanding bonds in 2 years. The bond makes payments of $100 each year. The current bond yield is 12%. What is the market price of XYZ bonds?

Answer: The bond market price is: $P = \frac{100}{1.12} + \frac{1{,}000}{(1.12)^2} = 89.29 + 876.91 = \$966.20.$

Diff: 1
Section: 15.9

130) ABC corporation has issued a series of bonds maturing in 3 years with face value of $1,000. The bonds make annual interest payments of $120. XYZ corporation has also issued a series of bonds maturing in 3 years with face value of $1,000. However, XYZ's bonds will make annual interest payments of $60. Currently, in the market, XYZ's bonds offer a yield of 20% while ABC corporation bonds offer a yield of 8%. Calculate the current market prices of each corporation's bonds. Is either corporate bond trading at below face value?

Answer: The market price of ABC corporation bonds are:

$P_{ABC} = \frac{120}{1.08} + \frac{120}{1.08^2} + \frac{1{,}120}{1.08^3} = \$1{,}103.84.$ The market price of XYZ corporation bonds are: $P_{XYZ} = \frac{60}{1.20} + \frac{60}{1.20^2} + \frac{1{,}060}{1.20^3} = \$705.09.$ XYZ corporate bonds are trading below face value. The bond coupon rate is below the market yield for XYZ corporation.

Diff: 2
Section: 15.9

131) Samantha feels that XYZ corporation is currently a high growth corporation. She expects dividend payments to rise by 30% each year for the next 2 years. After that, she expects dividends to remain constant for perpetuity. Next year, dividends will be $1.00. Samantha's appropriate discount rate is 12% for this investment option. Based on Samantha's expectations, what price is she willing to pay to receive the flow of dividends? If the stock is currently trading for $11, should she purchase the stock to capture the dividend stream?

Answer: The present value of XYZ dividends according to Samantha is:

$P = \frac{1}{1.12} + \frac{1.3}{(1.12)^2} + \frac{\left(\frac{1.3}{0.12}\right)}{(1.12)^3} = 9.64.$ Given the present value of the dividend stream is less than the current market price, Samantha should not purchase the stock for the dividend flow.

Diff: 2
Section: 15.9

132) Joel has $20,000 he would like to invest. He would like to pursue the investment option that gives him the highest return in 3 years. His options are presented in the table below. Which investment option should he select to maximize his 3 year return?

Year	Option A	Option B	Option C
0	–$20,000	–$20,000	–$20,000
1	$1,000	$5,000	$0
2	$2,000	$5,000	$0
3	$18,000	$11,000	$26,620

Answer: Option C provides the following return:

$20{,}000 = \frac{26{,}620}{(1+r)^3} \Leftrightarrow (1+r)^3 = \frac{26{,}620}{20{,}000} \Leftrightarrow r = 0.10$. Since Options A and B provide a smaller rate of return, Joel should invest in Option C to maximize his 3 year rate of return.

Diff: 2
Section: 15.9

133) Sally's Fitness is considering installing new exercise equipment. If she does so, she expects the payment stream in the table below before the equipment must be replaced. To finance the equipment purchase, she must take out a loan at 9%. Does the equipment investment offer a positive net present value?

Year	Cashflow	Present Value
0	–$12,500	
1	$4,000	
2	$4,000	
3	$4,000	
4	$4,000	
5	$4,000	

Answer: The present value of the cash flows is positive at 9% interest. This implies that Sally should make the equipment investment.

Year	Cashflow	Present Value
0	–$12,500	–$12,500
1	$4,000	$3,669.72
2	$4,000	$3,366.72
3	$4,000	$3,088.73
4	$4,000	$2,833.70
5	$4,000	$2,599.73
Total		$3,058.60

Diff: 2
Section: 15.9

134) Mitchell operates a diner in Pleasantville. Currently, the diner is not certified by the Pleasantville Restaurant Club. To get the diner certified, Mitchell would need to spend $20,000. Once certified, Mitchell expects to receive $5,000 in additional profits every year for perpetuity beginning 1 year from certification. What must Mitchell's discount rate be if he gets certified by the restaurant club?

Answer: If Mitchell gets his diner certified, it must be that: $20{,}000 < \frac{5{,}000}{r} \Leftrightarrow r < 0.25$.

Diff: 1
Section: 15.9

135) Ed's Electronic Devices has an asset beta of 1.2. The market rate of return is 12% and the risk–free rate of return is 2%. Ed is considering updating his production technology. If he does so, he expects the cash streams indicated in the table below. Given this information, should Ed update his production technology?

Year	Cashflow	Present Value
0	–$100,000	
1	$25,000	
2	$25,000	
3	$25,000	
4	$25,000	
5	$25,000	
6	$25,000	
Total		

Answer: The present value of the cash flow is given in the table below. As indicated in the table, the net present value of the cash flow is negative. This implies that Ed should not update his production technology.

Year	Cash Flow	Present Value
0	–$100,000	–$100,000
1	$25,000	$21,929.824
2	$25,000	$19,236.688
3	$25,000	$16,874.287
4	$25,000	$14,802.007
5	$25,000	$12,984.217
6	$25,000	$11,389.664
Total		–$2,783.32

Diff: 2
Section: 15.9

136) Ed's Electronic Devices has an asset beta of 0.6. The market rate of return is 12% and the risk–free rate of return is 2%. Ed is considering updating his production technology. If he does so, he expects the cash streams indicated in the table below. Given this information, should Ed update his production technology?

Year	Cashflow	Present Value
0	–$100,000	
1	$25,000	
2	$25,000	
3	$25,000	
4	$25,000	
5	$25,000	
6	$25,000	
Total		

Answer: The present value of the cash flow is given in the table below. As indicated in the table, the net present value of the cash flow is negative. This implies that Ed should not update his production technology.

Year	Cashflow	Present Value
0	–$100,000	–$100,000
1	$25,000	$23,148.15
2	$25,000	$21,433.47
3	$25,000	$19,845.81
4	$25,000	$18,375.75
5	$25,000	$17,014.58
6	$25,000	$15,754.24
Total		$15,571.99

Diff: 2
Section: 15.6

137) Robert is considering purchasing a new or used car. Based on his value of transportation, expected maintenance costs, auto loan payments and insurance rates of each car he has derived the table below. If he buys the new car, the loan rate is 6%. If he buys a used car, the loan rate will be 11%. Given this information, which car provides the highest net present value?

Year	New Car Values	Used Car Values
0	-$20,000	-$8,000
1	$4,000	$3,000
2	$4,000	$3,000
3	$4,000	$3,000
4	$4,000	$3,000
5	$4,000	$3,000
6	$12,000	$4,500

Answer: The used car provides the highest net present value. This implies that Robert should purchase the used car. This is shown in the table below.

Year	New Car Values		Used Car Values	
	Flow	PV	Flow	PV
0	-$20,000	-$20,000	-$8,000	-$8,000
1	$4,000	$3,773.585	$3,000	$2,702.703
2	$4,000	$3,559.986	$3,000	$2,434.867
3	$4,000	$3,358.477	$3,000	$2,193.574
4	$4,000	$3,168.375	$3,000	$1,976.193
5	$4,000	$2,989.033	$3,000	$1,780.354
6	$12,000	$8,459.526	$4,500	$2,405.884
Total		$5,308.982		$5,493.575

Diff: 2
Section: 15.6

138) Rita is considering purchasing a new or used car. Based on her value of transportation, expected maintenance costs, auto loan payments, and insurance rates of each car she has derived the table below. If she buys the new car, the loan rate is 6%. If she buys a used car, the loan rate will be 11%. Given this information, which car provides the highest net present value?

Year	New Car Values	Used Car Values
0	-$20,000	-$12,000
1	$4,000	$3,000
2	$4,000	$3,000
3	$4,000	$3,000
4	$4,000	$3,000
5	$4,000	$3,000
6	$12,000	$4,500

Answer: The new car provides the highest net present value. This implies that Rita should purchase the used car. This is shown in the table below.

Year	New Car Values		Used Car Values	
	Flow	PV	Flow	PV
0	-$20,000	-$20,000	-$12,000	-$12,000.00
1	$4,000	$3,773.585	$3,000	$2,702.70
2	$4,000	$3,559.986	$3,000	$2,434.87
3	$4,000	$3,358.477	$3,000	$2,193.57
4	$4,000	$3,168.375	$3,000	$1,976.19
5	$4,000	$2,989.033	$3,000	$1,780.35
6	$12,000	$8,459.526	$4,500	$2,405.88
Total		$5,308.982		$1,493.57

Diff: 2
Section: 15.6

139) Your aunt owns a gold mine. The marginal extraction cost of gold is $25 and remains constant over time. The current market price of a unit of gold is $200. Your aunt's appropriate discount rate is 12%. Next year, your aunt expects the price of a unit of gold to be $222. Should your aunt extract any gold from the mine this year?

Answer: No, she should not extract and sell any gold currently. This is because the return on the gold left in the mine exceeds her discount rate. That is,
$\left(P_{t+1} - c\right) > (1 + r)(P_t - c) \rightarrow (222 - 25) > (1.12)(200 - 25).$

Diff: 2
Section: 15.8

Chapter 16 General Equilibrium and Economic Efficiency

1) Which of these is NOT an exercise in general equilibrium analysis?
   A) A discussion of factors within the wheat market that influence wheat prices
   B) An analysis of the effects of changes in oil prices upon the natural gas market
   C) An evaluation of relationships between the markets for tires and automobiles
   D) none of the above

   Answer: A
   Diff: 1
   Section: 16.1

2) General equilibrium analysis is different from partial equilibrium analysis in that general equilibrium analysis
   A) explicitly takes feedback effects into account and partial equilibrium analysis does not.
   B) does not take into consideration specific problems, but partial equilibrium analysis does.
   C) takes into consideration specific problems, but partial equilibrium analysis does not.
   D) allows one to arrive at a specific conclusion, but partial equilibrium analysis does not.

   Answer: A
   Diff: 1
   Section: 16.1

3) The United States and Brazil are competitors in the world soybean market. In the late 1960s and early 1970s, the Brazilian government developed regulations designed to encourage Brazilian soybean production and exports. An unanticipated effect of the Brazilian regulations was to stimulate U.S. soybean production and exports. The type of economic analysis that would explain and predict these effects is called
   A) closed economy macroeconomics.
   B) international economics.
   C) partial equilibrium analysis.
   D) full market analysis.
   E) general equilibrium analysis.

   Answer: E
   Diff: 1
   Section: 16.1

4) The markets for movie theater tickets and videocassette rentals are highly interdependent. Suppose that a tax is imposed on movie theater tickets. The type of analysis that examines the effects of this tax on the markets for movie theater tickets and videocassettes simultaneously is called
   A) macroeconomics.
   B) general equilibrium analysis.
   C) partial equilibrium analysis.
   D) full market analysis.
   E) psychoanalysis.

   Answer: B
   Diff: 1
   Section: 16.1

5) Which of the following is true? Partial equilibrium analysis will
   A) overstate the impact of a tax for both substitutes and complements.
   B) understate the impact of a tax for both substitutes and complements.
   C) understate the impact of a tax for complements and overstate the impact for substitutes.
   D) understate the impact of a tax for substitutes and overstate the impact for complements.

Answer: D
Diff: 2
Section: 16.1

6) Gasoline and bicycles are complements in consumption. Suppose we increase the federal gasoline tax to $1 per gallon. What are the initial changes that result from the tax as these markets adjust to a new general equilibrium?
   A) Gasoline price rises, demand for bicycles shift s leftward.
   B) Gasoline price rises, demand for bicycles shifts rightward.
   C) Gasoline price rises, move downward along bicycle demand curve.
   D) Gasoline price rises, move upward along bicycle demand curve.

Answer: B
Diff: 2
Section: 16.1

7) Gasoline and bicycles are complements in consumption. Suppose we increase the federal gasoline tax to $1 per gallon. Initially, the gasoline price rises due to the tax, and the demand curve for bicycles shifts rightward because these goods are complements. What are the secondary changes that result from the gasoline tax as these markets adjust to a new general equilibrium?
   A) Bicycle price rises, demand for gasoline shift s leftward.
   B) Bicycle price rises, demand for gasoline shifts rightward.
   C) Bicycle price declines, demand for gasoline shifts leftward.
   D) Bicycle price declines, demand for gasoline shifts rightward.

Answer: B
Diff: 2
Section: 16.1

8) Gasoline and bicycles are complements in consumption. Suppose we increase the federal gasoline tax to $1 per gallon. Initially, the gasoline price rises due to the tax, and the demand curve for bicycles shifts rightward because these goods are complements. Then, the bicycle price rises, and the demand curve for gasoline shifts rightward. Assuming the general equilibrium is achieved in both markets after these two steps, which of the following statements is NOT true?
   A) Partial equilibrium analysis only focuses in the first–round changes in the gasoline market (ignoring the secondary effects that arise from changes in the bicycle market).
   B) Partial equilibrium analysis would predict a larger shift in the price and quantity demanded for gasoline than a general equilibrium analysis.
   C) The price increase in gasoline is larger under the general equilibrium approach, but the change in the quantity of gasoline demanded is smaller than under partial equilibrium analysis.
   D) All of these statements are true.

Answer: C
Diff: 2
Section: 16.1

Scenario 16.1:
Irrespective of the amount of cheese doodles and pretzels that Sam consumes, his marginal rate of substitution of cheese doodles for pretzels is 2. Also, irrespective of the amount of cheese doodles and pretzels that Sally consumes, her marginal rate of substitution of cheese doodles for pretzels is 3.

9) Refer to Scenario 16.1. Initially Sam and Sally are allocated 10 cheese doodles and 10 pretzels each. Which of the following statements are TRUE?
   A) The initial allocation is Pareto optimal as it is equitable.
   B) The initial allocation is Pareto optimal as Sally and Sam have equal amounts of both goods.
   C) The allocation is not Pareto optimal. An allocation that gave Sam all of the cheese doodles and Sally all of the pretzels would make both of them better off.
   D) The allocation is not Pareto optimal. An allocation that gave Sam four of the cheese doodles and sixteen of the pretzels (leaving Sally the rest) would make both of them better off.

   Answer: C
   Diff: 2
   Section: 16.2

10) Refer to Scenario 16.1. Suppose instead that Sam is initially allocated 3 cheese doodles and 3 pretzels, whereas Sally is initially allocated 6 cheese doodles and 10 pretzels. Which of the following statements is TRUE?
   A) This allocation is Pareto optimal.
   B) This allocation is not Pareto optimal as Sally and Sam have unequal amounts of each good.
   C) The allocation is not Pareto optimal as Sally would be willing to exchange two pretzels for one cheese doodle and be better off, without making Sam worse off.
   D) The allocation is not Pareto optimal as Sam would willing exchange one pretzel for two cheese doodles and be better off, without making Sally worse off.

   Answer: C
   Diff: 2
   Section: 16.2

11) An allocation in which one person can be made better off only by making someone else worse off is
   A) inefficient.
   B) efficient.
   C) a partial equilibrium.
   D) a general equilibrium.

   Answer: B
   Diff: 1
   Section: 16.2

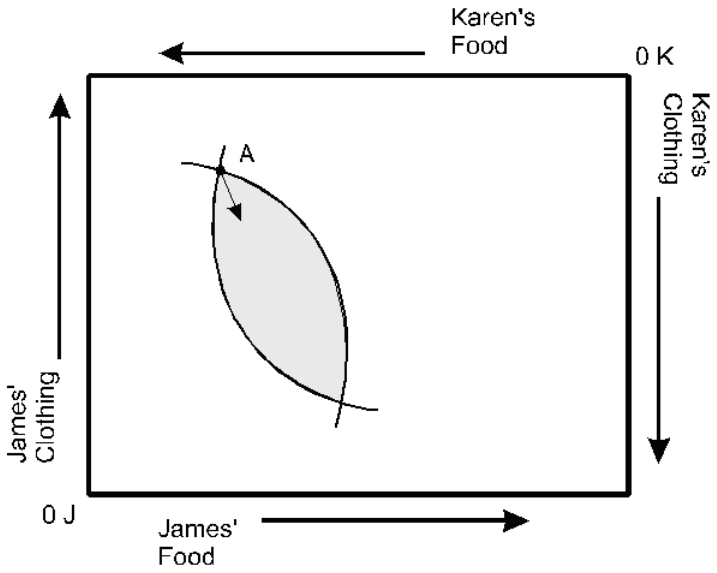
12) An efficient allocation of goods in an exchange economy means that
   A) goods were produced by the most efficient technology available.
   B) no one can be made better off without making somebody else worse off.
   C) those made worse off are not hurt as badly as the benefits resulting from those made better off. That is, there is a net positive gain.
   D) in a particular production process one gets the maximum output for a given input.

   Answer: B
   Diff: 1
   Section: 16.2

13) In a problem involving exchange, the contract curve shows
A) all exchanges that make both parties better off.
B) the one exchange that makes both parties better off.
C) all possible allocations of goods between both parties.
D) all possible efficient allocations between both parties.

Answer: D
Diff: 1
Section: 16.2

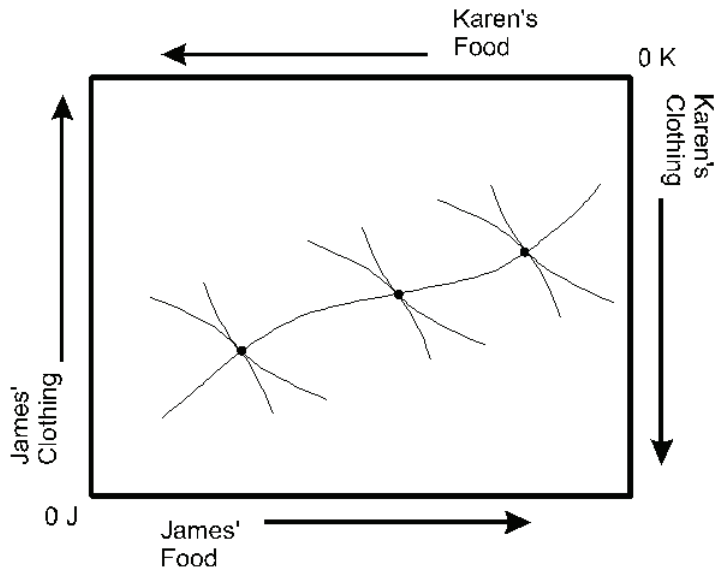
14) The Edgeworth box illustrates possibilities for Karen and James to increase their satisfaction by trading goods. If point A gives the initial allocation of food and clothing, a movement into the shaded area:



A) leaves Karen better off, but James worse off.
B) leaves James better off, but Karen worse off.
C) leaves James and Karen worse off.
D) leaves James and Karen better off.

Answer: D
Diff: 1
Section: 16.2

15) The curve in the diagram below is called:



A) the contract curve.
B) the utility possibilities frontier.
C) the production possibilities frontier.
D) the production contract curve.

Answer: A
Diff: 1
Section: 16.2

16) The contract curve in an Edgeworth Box diagram illustrates
A) the only efficient allocation of goods among individuals.
B) all possible efficient allocations of goods among individuals.
C) all equitable distributions of goods among individuals.
D) the only equitable distribution of goods among individuals.

Answer: B
Diff: 1
Section: 16.2

17) Which of the following is true at the exchange equilibrium between two individuals?
A) Their marginal rates of substitution are equal.
B) The slopes of the individuals' indifference curves are equal.
C) Both individuals' marginal rates of substitution are equal to the ratio of the prices of the goods.
D) A and B only
E) A, B, and C are all true.

Answer: E
Diff: 2
Section: 16.2

18) To be certain that exchange between people is mutually beneficial, we generally assume
A) not all people are free to enter the market at will, but once in they are free to make any offer to trade.
B) all people have complete information about each other's preferences.
C) there are no transaction costs.
D) both B and C
E) both A and B

Answer: D
Diff: 2
Section: 16.2

Scenario 16.2:
Sam and Sally are the only consumers in an economy where tee shirts and candy are the only commodities that are consumed. The marginal utility schedule for each appears below.

Sam	tee shirts	MU(tee shirts)	Candy	MU(Candy)
	1	10	1	6
	2	9	2	5
	3	8	3	4
	4	7	4	5
	5	6	5	4

Sally	tee shirts	MU(tee shirts)	Candy	MU(Candy)
	1	24	1	12
	2	19	2	9
	3	18	3	8
	4	14	4	7
	5	10	5	3

There are 7 candies and 7 tee shirts total in the economy. Sam has 3 tee shirts and 3 candies. Sally has 4 tee shirts and 4 candies.

19) Refer to Scenario 16.2. What is Sam's marginal rate of substitution of tee shirts for candy at the current distribution?
A) 3.
B) 2.
C) 1/4.
D) It is impossible to determine without the prices of each commodity.

Answer: B
Diff: 1
Section: 16.2

20) Refer to Scenario 16.2. What is Sally's marginal rate of substitution of tee shirts for candy at the current distribution?
A) 7/2.
B) 2
C) 1/2.
D) It is impossible to determine without the prices of each commodity.

Answer: B
Diff: 1
Section: 16.2

21) Refer to Scenario 16.2. Is the current distribution Pareto optimal?
A) Yes.
B) No, as Sam could trade Sally a piece of candy for a tee shirt and both people would be better off.
C) No, as Sam could trade Sally a tee shirt for a piece of candy and both people would be better off.
D) Without the prices of each commodity it is impossible to determine if this distribution is Pareto optimal.

Answer: A
Diff: 2
Section: 16.2

Scenario 16.3:
Continue to use the data from Scenario 2 but consider the case when the goods are redistributed such that Sam has 4 tee shirts and 4 candies. Sally has 3 tee shirts and 3 candies.

22) Refer to Scenario 16.3. What is Sam's marginal rate of substitution of tee shirts for candy at the current distribution?
A) 2.
B) 7/5.
C) 5/7.
D) It is impossible to determine without the prices of each commodity.

Answer: B
Diff: 1
Section: 16.2

23) Refer to Scenario 16.3. What is Sally's marginal rate of substitution of tee shirts for candy at the current distribution?
A) 9/4.
B) 2
C) 4/9.
D) It is impossible to determine without the prices of each commodity.

Answer: A
Diff: 1
Section: 16.2

24) Refer to Scenario 16.3. Is the current distribution Pareto optimal?
A) Yes.
B) No, as Sam has more of both goods.
C) No, as it is possible to find a way for Sam to sell tee shirts to Sally (and receive candy in return) that would make both of them better off.
D) No, as it is possible to find a way for Sam to sell candy to Sally (and receive tee shirts in return) that would make both of them better off.
E) Without knowing the prices of tee shirts and candy we cannot determine if this distribution is Pareto optimal.

Answer: C
Diff: 2
Section: 16.2

25) Refer to Scenario 16.3. What is the relative price of tee shirts to candy?
A) $2.25
B) $2
C) $1.40
D) The relative price will be between $2.25 and $1.40.
E) It is impossible to determine.

Answer: E
Diff: 1
Section: 16.2

26) If the initial distribution of two goods between two people is Pareto optimal, which of the following statements is TRUE?
A) It is possible to reallocate the goods between the two people so as to increase the utility of both people.
B) It is possible to reallocate the goods between the two people so as to increase the utility of one person without decreasing the utility of the other.
C) It is possible to reallocate the goods between the two people so as to increase the utility of one person, but only at the expense of the other person.
D) It is impossible to reallocate the goods between the two people so as to increase either person's utility.
E) none of the above

Answer: C
Diff: 2
Section: 16.2

27) Suppose there is a water shortage, and the governor proposes that the government distribute equal quantities of water to each person at no cost to the consumers. If consumers were forbidden to trade water, would such a distribution be Pareto optimal?
A) Yes, because each person has the same amount of water as everyone else.
B) Yes, because everyone would be receive their water for free.
C) Not necessarily, as people may differ in their marginal rates of substitution between water and other goods.
D) It is impossible to determine without knowing the price of water.
E) none of the above

Answer: C
Diff: 3
Section: 16.2

28) If the initial distribution of labor and capital is Pareto optimal, which of the following statements is TRUE?
A) It is possible to reallocate labor and capital across industries so as to increase the production of one good without decreasing the production of another good.
B) It is possible to reallocate labor and capital across industries so as to increase the production of one good, but only by reducing the production of another good.
C) It is possible to reallocate labor and capital across industries so as to increase the production of every good.
D) none of the above

Answer: B
Diff: 2
Section: 16.2

29) Why does perfect competition guarantee a Pareto optimal distribution of goods between two people? Under perfect competition,
A) everyone has the same preferences.
B) everyone faces the same prices.
C) everyone consumes the same quantity of both goods.
D) goods are homogeneous.

Answer: B
Diff: 2
Section: 16.2

30) All possible efficient allocations of 2 goods between 2 people are located on
A) the indifference curve.
B) the contract curve.
C) the production possibilities frontier.
D) the budget line.

Answer: B
Diff: 1
Section: 16.2

31) A move from one point on a contract curve to another point on the contract curve will make
A) both individuals better off.
B) both individuals worse off.
C) one individual better off and the other individual worse off.
D) the goods more expensive.

Answer: C
Diff: 1
Section: 16.2

32) Once a point on a contract curve has been chosen,
A) it is possible to make both individuals better off.
B) it is possible to make one individual better off only at the expense of the other.
C) there is no change that would make both individuals worse off.
D) it is impossible for both individuals to have more of both goods.

Answer: B
Diff: 1
Section: 16.2

33) In an Edgeworth box, all points of efficiency occur at the
A) intersections of the indifference curves.
B) the points of tangency between the sets of indifference curves.
C) in the midpoint of the diagram.
D) at any point other than the intersections of the indifference curves.

Answer: B
Diff: 1
Section: 16.2

34) The statement: "If everyone trades in the competitive marketplace, all mutually beneficial trades will be completed, and the resulting equilibrium allocation of resources will be economically efficient." is formally known as:
A) the law of supply and demand.
B) the first theorem of supply and demand.
C) the first theorem of welfare economics.
D) the first theorem of efficiency in economics.

Answer: C
Diff: 1
Section: 16.2

35) Suppose there are 10 apples and 10 oranges in the economy. Joe is currently consuming 4 apples and 5 oranges, and Jane is consuming 6 apples and 5 oranges. At this allocation, Joe's marginal utility of apples is 3, and his marginal utility of oranges is 5. Jane's marginal utility of apples is 9. The current allocation is necessarily efficient if:
A) the price of apples is 60% of the orange price.
B) Jane's marginal utility of oranges is 6 at this point.
C) Joe's MRS equal the MRT.
D) Jane's marginal utility of oranges is 15 at this point.

Answer: A
Diff: 2
Section: 16.2

36) For an individual consumer, a corner solution may be optimal such that MRS and MRT are not equal,
A) but this is not possible in an Edgeworth Box due to the transitivity of preferences.
B) but this is not possible in an Edgeworth Box because price ratios must be positive.
C) and this may also occur in an Edgeworth Box.
D) and this may only occur in an Edgeworth Box under the perfect complements case.

Answer: C
Diff: 2
Section: 16.2

37) Use the following statements to answer this question:
I. The first theorem of welfare economics refers to efficient allocation of goods across groups of consumers, and it does not consider the problem of efficient production of these goods.
II. The only way to achieve an efficient allocation of goods is to use competitive markets.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are true.

Answer: B
Diff: 1
Section: 16.2

38) The slope of the utility possibilities frontier is
A) positive.
B) negative.
C) zero.
D) undefined.

Answer: B
Diff: 1
Section: 16.3

39) What is TRUE about every point along a utilities possibilities frontier?
A) Markets are perfectly competitive.
B) It is possible to move to from one point on the frontier to another point and make everyone better off.
C) All allocations are efficient.
D) It includes some unattainable points.

Answer: C
Diff: 1
Section: 16.3

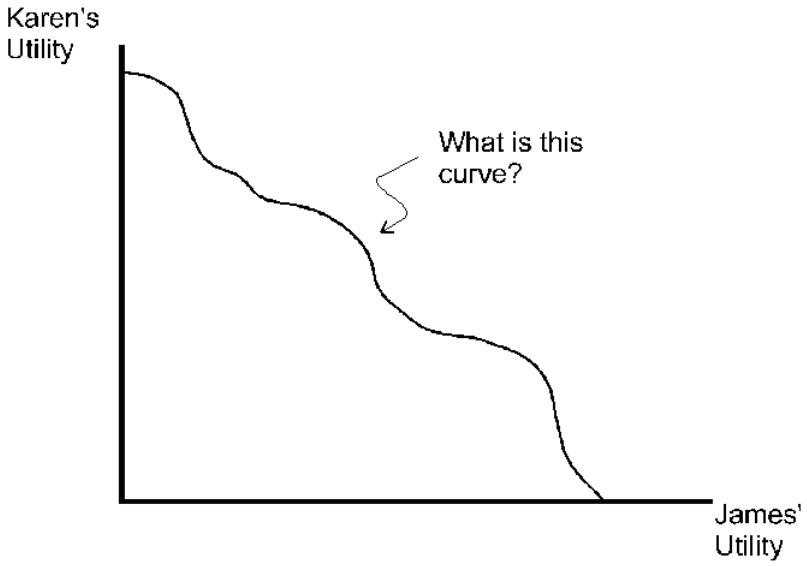
40) What does the negative slope of the utilities possibilities frontier imply?
A) Diminishing marginal utility.
B) The only way to increase one person's utility is to decrease another person's utility.
C) Diminishing marginal rates of substitution.
D) The only way to increase output of one good is to decrease output of another.

Answer: B
Diff: 1
Section: 16.3

41) All points within the utilities possibilities frontier are
A) unattainable. B) efficient. C) inefficient. D) profitable.

Answer: C
Diff: 1
Section: 16.3

42) The curve in the diagram is called:



A) the contract curve. B) the utility possibilities frontier.
C) the production possibilities frontier. D) the production contract curve.

Answer: B
Diff: 1
Section: 16.3

43) Assume there are only two individuals in an economy, Lisa and Bart. The utility possibilities frontier for these individuals is given as:

$$120 = U_L + U_B$$

where U_L is Lisa's utility and U_B is Bart's utility. Lisa's current level of utility is 20, Bart's level of utility is 90. This combination is:

A) inefficient.
B) economically efficient.
C) impossible, because it is outside of the welfare frontier.
D) none of the above

Answer: A
Diff: 2
Section: 16.3

44) Which of these statements is generally accepted by economists? Perfect competition

A) provides both equity and efficiency.
B) provides equity but not necessarily efficiency.
C) provides efficiency but not necessarily equity.
D) generally satisfies neither efficiency nor equity.

Answer: C
Diff: 2
Section: 16.3

45) From a point within the utilities possibilities frontier,

A) movement to another point within the frontier can only increase one person's utility, but not both people's utility.
B) it is possible to find another point within the frontier that generates higher utility for both people.
C) it is possible to find another point within the frontier that involves higher output of both goods.
D) any move to another point within the frontier will necessarily decrease someone's utility.

Answer: B
Diff: 1
Section: 16.3

46) A point lying beyond the utilities possibilities frontier is

A) unattainable. B) efficient. C) inefficient. D) profitable.

Answer: A
Diff: 1
Section: 16.3

47) When comparing point A, which lies within a utilities possibilities frontier, with point B, which lies on the same utilities possibilities frontier,

A) both A and B are efficient. B) both A and B are equitable.
C) both A and B may be equitable. D) neither A nor B could be equitable.

Answer: C
Diff: 3
Section: 16.3

48) Locating a point on a utilities possibilities frontier gives you information about
A) both equity and efficiency.
B) equity but not efficiency.
C) efficiency but not equity.
D) profitability but not efficiency.

Answer: C
Diff: 1
Section: 16.3

49) When comparing point A, which lies within a utilities possibilities frontier, with point B, which lies on the same utilities possibilities frontier,
A) A is necessarily more efficient than B.
B) A is necessarily more equitable than B.
C) B is necessarily more efficient than A.
D) B is necessarily more equitable than A.

Answer: C
Diff: 2
Section: 16.3

50) When comparing point A, which lies within a utilities possibilities frontier, with point B, which lies on the same utilities possibilities frontier,
A) A may be more efficient than B.
B) A is necessarily more equitable than B.
C) B may be more equitable than A.
D) B is necessarily more equitable than A.

Answer: C
Diff: 3
Section: 16.3

51) Use the following statements to answer this question:
I. Following the properties of indifference curves, the utility possibilities frontier should be convex to (bowed into toward) the origin.
II. The slope of the utility possibilities frontier equals –1 times the slope of the contract curve.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: D
Diff: 2
Section: 16.3

52) The main point of the second theorem of welfare economics is that:
A) efficiency is more important than equity.
B) efficiency may be achieved, but equity is not a feasible goal.
C) any attempt to achieve an equitable outcome must occur off the contract curve.
D) any equitable outcome can be achieved by reallocating the resources among the members of a society.

Answer: D
Diff: 2
Section: 16.3

53) The Rawlsian view of equity would lead to:
A) equal allocations of goods across all persons.
B) maximizing the utility of the least–well–off person.
C) maximizing the total utility of all society members.
D) none of the above

Answer: B
Diff: 1
Section: 16.3

54) A competitive equilibrium is efficient in the production and exchange of two goods X and Y when
A) $MRS_{XY} = MRT_{LK}$ (where L = labor input and K = capital input).
B) $MRT_{XY} = MRS_{LK}$ (where L = labor input and K = capital input).
C) MRSxy = MRTxy.
D) $MC_X/MC_Y = P_Y/P_X$.

Answer: C
Diff: 2
Section: 16.4

55) In an economy which produces two goods X and Y, using two inputs L and K, efficient input use occurs when
A) $MRTS_{LK}^X = MRS_{LK}^Y$
B) $MRT_{XY} = MRS_{XY}$
C) $MRS_X/P_X = MRS_Y/P_Y$
D) $MRTS_{LK}^X = MRTS_{LK}^Y$

Answer: D
Diff: 2
Section: 16.4

56) Which of the following is a condition for efficiency in the output market?
A) $MRT = MP_L/MP_K$
B) The marginal rate of substitution is the same for all customers.
C) The marginal rate of technical substitution must be the same for all producers.
D) The marginal rate of transformation must equal the marginal rate of substitution.

Answer: D
Diff: 2
Section: 16.4

57) The slope of the production possibilities frontier is
A) positive.
B) negative.
C) zero.
D) undefined.

Answer: B
Diff: 1
Section: 16.4

58) What is TRUE about every point along a production possibilities frontier?
A) Both people are maximizing utility.
B) It is impossible to increase production of either good.
C) All allocations are efficient.
D) It includes some unattainable points.

Answer: C
Diff: 1
Section: 16.4

59) What does the negative slope of the production possibilities frontier imply?
A) Diminishing marginal utility.
B) The only way to increase one person's utility is to decrease the other's.
C) Diminishing marginal rates of technical substitution.
D) The only way to increase output of one good is to decrease output of another.

Answer: D
Diff: 1
Section: 16.4

60) All points within the production possibilities frontier are
A) unattainable. B) efficient. C) inefficient. D) profitable.

Answer: C
Diff: 1
Section: 16.4

61) From any point within the production possibilities frontier,
A) the only way to increase production of one good is to decrease production of the other.
B) it is possible to increase both people's utility.
C) it is possible to increase output of both goods.
D) any move will necessarily decrease production of some good.

Answer: C
Diff: 1
Section: 16.4

62) A point lying to the northeast of the production possibilities frontier is
A) unattainable. B) efficient. C) inefficient. D) profitable.

Answer: A
Diff: 1
Section: 16.4

63) The slope of the production possibilities frontier is defined to be the marginal rate of
A) transformation. B) technical substitution.
C) substitution. D) profit.

Answer: A
Diff: 1
Section: 16.4

64) Why is the production possibilities frontier concave to (bowed away from) the origin?
A) Consumers have declining marginal utility, so their relative satisfaction from consuming a good changes as they move from high levels to low levels of consumption.
B) The shape of the curve is due to the marginal costs of producing the two goods. At high levels of output for a particular good, the marginal cost is very high, and the firm can use the same inputs to produce a relatively large quantity of the other good.
C) For a production possibilities frontier, we no longer assume firms are price takers, and the input prices and output prices change as the firms alter their mix of outputs.
D) none of the above

Answer: B
Diff: 2
Section: 16.4

65) Suppose an economy produces milk and honey, and milk is plotted along the horizontal axis of the production possibilities frontier. If the production in the economy is centrally planned (and not market oriented) so that the MRS for the current production level is 3 but the MRT is 2, then there will be an excess _____ for milk and an excess _____ for honey.
A) demand, supply
B) demand, demand
C) supply, demand
D) supply, supply
E) The market is in equilibrium, and there are no imbalances in supply or demand.

Answer: A
Diff: 2
Section: 16.4

66) The condition that requires MRTS for each input pair to equal the ratio of their marginal costs is known as _____ efficiency, and the condition that requires MRS for each output pair to equal their output price ratio is known as _____ efficiency.
A) economic, market
B) micro, macro
C) cost, revenue
D) technical, output

Answer: D
Diff: 1
Section: 16.4

67) Which of the following is not a cause of market failure?
A) Incomplete information
B) Externalities
C) Individuals acting according to their own self–interest
D) Public goods

Answer: C
Diff: 1
Section: 16.7

68) Use the following statements to answer this question.
I. There are potential gains from trade when the economies of two countries differ so that one country has an absolute advantage in producing one good, while the second country has an absolute advantage in producing another good.
II. A country has an absolute advantage in producing a good if its cost is lower than the cost in another country.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: C
Diff: 2
Section: 16.5

The following table summarizes the production relationships in Mexico and Guatemala to produce tomatoes and beer:

Table 16.1
Hours of Labor Required to Produce

	Tomatoes	Beer
	(1 lb.)	(1 gal.)
Guatemala	6	3
Mexico	2	2

69) Refer to Table 16.1. Which of the following statements is TRUE?
A) Guatemala has an absolute advantage in producing tomatoes.
B) Guatemala has an absolute advantage in producing beer.
C) Guatemala has a comparative advantage in producing beer.
D) Guatemala has a comparative advantage in producing tomatoes.
E) all of the above

Answer: C
Diff: 2
Section: 16.5

70) Refer to Table 16.1. Use the following statements to answer this question.
I. Mexico has an absolute advantage in the production of tomatoes and beer.
II. Mexico has a comparative advantage in the production of tomatoes.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 2
Section: 16.5

71) Refer to Table 16.1. Which of the following statements is correct?
A) There are potential gains from trade if: (1) Mexico specializes in the production of tomatoes, (2) Guatemala specializes in the production of beer, and (3) Mexico trades tomatoes to Guatemala for beer.
B) There are potential gains from trade if: (1) Mexico specializes in the production of beer, (2) Guatemala specializes in the production of tomatoes, and (3) Mexico trades beer to Guatemala for tomatoes.
C) There are no potential gains from trade because Mexico has an absolute advantage in the production of beer and tomatoes.
D) There are no potential gains from trade because Guatemala has an absolute advantage in the production of beer and tomatoes.

Answer: A
Diff: 2
Section: 16.5

72) Refer to Table 16.1. Use the following statements to answer this question.
I. Trade between Mexico and Guatemala will allow Mexico to consume a combination of tomatoes and beer outside of Mexico's production possibilities frontier.
II. Trade between Mexico and Guatemala will allow Guatemala to consume a combination of tomatoes and beer outside of Guatemala's production possibilities frontier.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 2
Section: 16.5

73) Canada produces MP3 players and lumber, and the marginal costs for the two products are $200 per 1,000 board–feet of lumber and $100 per MP3 player. China also produces these goods, and the marginal costs are $300 per 1,000 board–feet of lumber and $100 per MP3 player. Which country has the comparative advantage in lumber production?
A) Canada
B) China
C) Both countries share the comparative advantage.
D) We need more information to answer this question.

Answer: A
Diff: 2
Section: 16.5

74) Canada produces MP3 players and lumber, and the horizontal axis for Canada's production possibilities frontier represents the amount of lumber produced. Canada's borders are not initially open to trade, and the country consumes along its production possibilities frontier where the MRT and MRS equal the price ratio for the two products ($200 per 1,000 board–feet of lumber versus $100 per MP3 player). If Canada opens its borders to trade with China at world prices for the two goods ($300 per 1,000 board–feet of lumber and $100 per MP3 player), what happens in the Canadian economy?
A) Canada will shift consumption along the original production possibilities frontier until MRT equals the world price ratio, and Canadians will consume less lumber and more MP3 players.
B) Canada will shift consumption along the original production possibilities frontier until MRT equals the world price ratio, and Canadians will consume more lumber and less MP3 players.
C) Canada will be able to trade with China, and the gains from trade allow Canada to afford bundles of the two goods that do not lie along the country's production possibilities frontier.
D) Canada may trade with China, but we do not have enough information to determine how the opening of the border will affect the trade decisions.

Answer: C
Diff: 2
Section: 16.5

75) Canada produces MP3 players and lumber, and the horizontal axis for Canada's production possibilities frontier represents the amount of lumber produced. Canada's borders are not initially open to trade, and the country consumes along its production possibilities frontier where the MRT and MRS equal the price ratio for the two products ($200 per 1,000 board –feet of lumber versus $100 per MP3 player). If Canada opens its borders to trade with China at world prices for the two goods ($300 per 1,000 board –feet of lumber and $100 per MP3 player), what trade pattern develops for Canada?

A) Canada will import lumber and MP3 players
B) Canada will import lumber and export MP3 players
C) Canada will export lumber and import MP3 players
D) Canada import lumber and MP3 players

Answer: C
Diff: 2
Section: 16.5

76) An economy produces outputs X and Y using inputs L and K. Which of the following is NOT required for economic efficiency?

A) $MRTS_{LK} = MRS_{XY}$ for all producers and consumers.
B) $MRT_{XY} = MRS_{XY}$ for all producers and consumers.
C) MRS_{XY} is equal for all consumers.
D) $MRTS_{LK}$ is equal for all producers.
E) None of the above. All of these are required for economic efficiency.

Answer: A
Diff: 2
Section: 16.6

77) Suppose MRTS is not the same across all producers. In this case, the economic outcome is not fully efficient because:

A) exchange is inefficient.
B) the use of inputs in production is inefficient.
C) the mix of outputs in inefficient.
D) none of the above

Answer: B
Diff: 1
Section: 16.6

78) Suppose MRS is not the same across all consumers. In this case, the economic outcome is not fully efficient because:

A) exchange is inefficient.
B) the use of inputs in production is inefficient.
C) the mix of outputs in inefficient.
D) none of the above

Answer: A
Diff: 1
Section: 16.6

79) If one of the agents in an Edgeworth Box has monopoly power and maximizes profit as the sole seller, then the economic outcome is:
A) inefficient because the monopoly has no incentive to be technically efficient.
B) inefficient because the monopoly produces less than the optimal amount of output.
C) Both A and B are correct.
D) none of the above

Answer: B
Diff: 2
Section: 16.7

80) Use the following statements to answer this question:
I. Incomplete information may lead to economic inefficiencies if consumers do not understand the complete set of benefits associated with a particular product.
II. Market power can lead to economic inefficiency, but only if the power is held by sellers and not by buyers (e.g., monopsony).
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: B
Diff: 1
Section: 16.7

81) Externalities can lead to inefficient economic outcomes because:
A) firms do not have to pay the full cost associated with using inputs that cause pollution.
B) firms that produce public goods tend to be monopolies.
C) Both A and B are correct.
D) none of the above

Answer: A
Diff: 2
Section: 16.7

82) The industry analysts have long recognized that there is a high degree of complementarity between automobile tires and gasoline. A recent study done by an automobile industry trade group estimated the following supply and demand functions:

$$Q_D^T = 5{,}250{,}000 - 12{,}500P^T - 750{,}000P^G$$

$$Q_S^T = -350{,}000 + 11{,}750P^T$$

$$Q_D^G = 80{,}500{,}000 - 30{,}000{,}000P^G - 2{,}500P^T$$

$$Q_S^G = 35{,}000{,}000 + 15{,}000{,}000P^G,$$

where Q_D^T and Q_S^T refer to quantities of tires demand and supplied each month measured in sets of four, Q_D^G and Q_S^G refer to quantities of gasoline demanded and supplied each month measured in gallons, P^G is the price of gasoline per gallon, and P^T is the price per set of four tires.

a. Calculate the equilibrium price and quantity that will prevail in both the tire and gasoline markets. (Hint: recall that Q_D must equal Q_S in each market.)

b. Assume that a recession causes the demand curve for gasoline to shift leftward as follows:

$$Q_D^G = 76{,}000{,}000 - 30{,}000{,}000P^G - 2{,}500P^T$$

Calculate the initial impact of this change in demand on the gasoline and tire markets. (You need calculate only one change in P and Q for each market.)

c. Discuss the changes that will occur after the initial round to move each market back to a stable equilibrium. Your answer to part (c) requires no calculations, but graphs would help convey your understanding of the process.

Answer: ***a.***

We have 4 equations and 6 unknowns. (Q_D^T, Q_S^T , P^T, Q_D^G, P^G, Q_S^G). At equilibrium, Q_D must equal Q_S so that we can eliminate two unknowns. Consequently, we have four equations and four unknowns. For tires:

$$Q_D^T = 5{,}250{,}000 - 12{,}500P^T - 750{,}000P^G$$

$$Q_S^T = -350{,}000 + 11{,}750P^T$$

Since Q_D^T must equal Q_S^T, we can write

$$5{,}250{,}000 - 12{,}500P^T - 750{,}000P^G = -350{,}000 + 11{,}750P^T$$

or

$$(1)\quad 0 = 5{,}600{,}000 - 24{,}250P^T - 750P^G$$

For gasoline:

$$Q_D^G = 80{,}500{,}000 - 30{,}000{,}000P^G - 2{,}500P^T$$

$$Q_S^G = 35{,}000{,}000 + 15{,}000{,}000P^G$$

Again $Q_D^G = Q_S^G$

$$80{,}500{,}000 - 30{,}000{,}000P^G - 2{,}500P^T = 35{,}000{,}000 + 15{,}000{,}000P^G$$

or

$$(2)\quad 0 = 45{,}500{,}000 - 2{,}500P^T - 45{,}000{,}000P^G$$

Solve equations 1 and 2 for P^T and P^G

$$(1)\quad 0 = 5{,}600{,}000 - 24{,}250P^T - 750P^G$$

$$(2)\quad 0 = 45{,}500{,}000 - 2{,}500P^T - 45{,}000{,}000P^G$$

Multiply (1) by 60 to eliminate P^G

$$(1A)\quad 0 = 336{,}000{,}000 - 1{,}455{,}000P^T - 45{,}000{,}000P^G$$

$$(2A)\quad 0 = 45{,}500{,}000 - 2{,}500P^T - 45{,}000{,}000P^G$$

(1A) + (2A) =

$$0 = 290{,}500{,}000 - 1{,}452{,}500P^T$$

$P^T = 200$

Substitute into 2 and solve for P^G

$0 = 45{,}500{,}000 - 2{,}500(200) - 45{,}000{,}000P^G$

$-45{,}000{,}000 = -45{,}000{,}000P^G$

$P^G = 1.00$

Substitute into $Q_S{}^T$ and $Q_S{}^G$ to determine quantities:

$Q_S{}^T = -350{,}000 + 11{,}750(200)$

$Q_S{}^T = 2{,}000{,}000$ sets of tires at \$200 per set

$Q_S{}^G = 35{,}000{,}000 + 15{,}000{,}000(1.00)$

$Q_S{}^G = 50{,}000{,}000$ gallons of gasoline at \$1/gallon

b.

Initially there is no change in tire market so that we can assume tire prices remain constant at \$200.

$Q_D{}^G = 80{,}500{,}000 - 30{,}000{,}000P^G - 2{,}500(200)$

The demand curve for gasoline becomes

$Q_D{}^G = 75{,}500{,}000 - 30{,}000{,}000P^G$

Equating $Q_D{}^G$ to $Q_S{}^G$

$75{,}500{,}000 - 30{,}000{,}000P^G = 35{,}000{,}000 + 15{,}000{,}000P^G$

$40{,}500{,}000 = 45{,}000{,}000P^G$

$P^G = 0.90$ per gallon

$Q_S{}^G = 35{,}000{,}000 + 15{,}000{,}000(0.90)$

$Q_S{}^G = 48{,}000{,}000$ gallons of gasoline at \$0.90/gallon

Demand curve for tires becomes:

$Q_D{}^T = 5{,}250{,}000 - 12{,}500P^T - 750{,}000(0.90)$

$Q_D{}^T = 4{,}575{,}000 - 12{,}500P^T$

Equating $Q_D{}^T$ to $Q_S{}^T$

$4{,}575{,}000 - 12{,}500P^T = -350{,}000 + 11{,}750P^T$

$4{,}925{,}000 = 24{,}250P^T$

$P^T = 203.09$

$Q_D{}^T = 4{,}575{,}000 - 12{,}500(203.09)$

$Q_D{}^T = 2{,}036{,}375$ sets of tires

Drop in price of gasoline shifted demand curve to right, increasing demand for tires.

c.

As the price of tires rises, the demand curve for gasoline will shift to the left once again because of the complementary relationship. Students drawing a diagram should show an initial leftward shift in the demand for gasoline followed by a rightward shift in tire demand and subsequent leftward shift in gasoline demand. The process could continue indefinitely, but must be stopped after a finite number of rounds.

Diff: 2
Section: 16.1

83) Two individuals, A and B, are free to engage in trade of clothing and food. Initially, A has 12 units of clothing and 9 units of food, and B has 8 units of clothing and 11 units of food. The individuals have the following utility functions in clothing C and food F:

$U_A = 0.15Q_C \cdot Q_F$

$U_B = 0.08Q_C \cdot Q_F$

where Q_F represents units of food, Q_C represents units of clothing, and U represents utility. Determine if a mutually beneficial trade is possible between A and B. If so, who would trade for what?

Answer: If, and only if, an efficient allocation exists, the MRS^A of clothing for food for A will equal the MRS^B of clothing for B

$$MRS_{CF}^{A} = \frac{dQ_F}{dQ_C} = \frac{\frac{\partial U}{\partial Q_C}}{\frac{\partial U}{\partial Q_F}} = \frac{0.15Q_F}{0.15Q_C} = \frac{Q_F}{Q_C} = \frac{9}{12} = 0.75$$

$$MRS_{CF}^{B} = \frac{0.08Q_F}{0.08Q_C} = \frac{11}{8} = 1.375$$

In this situation the MRS for A does not equal MRS for B; consequently there is a potential for mutually beneficial trade. Individual A is willing to give up at most 0.75 units of food to get one additional unit of clothing. Individual B is willing to give up at most 1.375 units of food to get one unit of clothing (or give up 0.727 units of clothing to get one unit of food). Therefore a mutually beneficial exchange can be made. A would trade clothing for food and B would trade food for clothing. The terms of trade would be between 0.75 and 1.375 depending upon the exact bargaining process.

Diff: 2
Section: 16.2

84) Sarah and Jane are two representative individuals living in an economy that produces two goods, X and Y. Sarah's and Jane's utility functions are given as:

Sarah: $U^S = 100X^{0.5}Y^{0.5}$

Jane: $U^J = 50X^{0.4}Y^{0.6}$

The market determined prices of X and Y are \$10 and \$20, respectively. Current outputs are 58 units of X per time period and 36 units of Y. Jane's current income is \$600 per time period, while Sarah's income is \$700 per time period.

a. Write expressions for Sarah and Jane's marginal rates of substitution.
b. Determine the quantities of X and Y that Sarah and Jane should consume in equilibrium.
c. Do the values calculated in part (b) satisfy the conditions for equilibrium in exchange? Explain using numbers.
d. Examine your answers in parts (b) and (c). If equilibrium has not been achieved, what would be necessary to reach equilibrium? If equilibrium has been achieved, comment on the process by which equilibrium was reached.

Answer: ***a.***

Jane's MRS:

$$MRS^J = \frac{MU_X}{MU_Y} = \frac{50X^{-0.50}Y^{0.50}}{50X^{0.50}Y^{-0.50}} = \frac{Y}{X}$$

Sarah's MRS:

$$MRS^S = \frac{MU_X}{MU_Y} = \frac{20X^{-0.60}Y^{0.60}}{30X^{0.40}Y^{-0.40}} = \frac{2}{3}\frac{Y}{X}$$

b.

For equilibrium, each individual must equate MRS to $\frac{P_X}{P_Y}$

$$\frac{P_X}{P_Y} = \frac{10}{20} = \frac{1}{2}$$

For Jane:

$$\frac{X}{Y} = \frac{1}{2},\ Y = \frac{1}{2}X$$

For Sarah:

$$\frac{2}{3}\frac{Y}{X} = \frac{1}{2},\ \frac{Y}{X} = \frac{3}{2}\cdot\frac{1}{2}$$

$$Y = \frac{3}{4}X$$

To determine quantities substitute into each individuals budget constraint.
Jane's budget constraint: $600 = 10X + 20Y$

substitute $Y = (1/2)X$
$600 = 10X + 20(1/2)X$
$600 = 10X + 10X$
$X = 30$

$600 = 10(30) + 20Y$
$300 = 20Y$
$Y = 15$

Jane should consume 30 units of X and 15 units of Y.
Sarah's budget constraint: $700 = 10X + 20Y$

substitute Y = (3/4)X

$700 = 10X + 20(3/4)X$

$700 = 25X$

$X = 28$

$700 = 10(28) + 20Y$

$420 = 20Y$

$Y = 21$

Sarah should consume 28 units of X and 21 units of Y.

c.

In equilibrium MRS^J should equal MRS^S.

$$MRS^J = \frac{Y}{X}$$

Jane is consuming 15 units of Y and 30 units of X.

$$MRS^J = \frac{15}{30} = \frac{1}{2}$$

$$MRS^S = \frac{2}{3}X$$

Sarah is consuming 21 units of Y and 28 units of X.

$$MRS^S = \left(\frac{2}{3}\right)\left(\frac{21}{28}\right) = \frac{42}{84} = \frac{1}{2}$$

MRS^J does equal MRS^S, and it is also true that the two individuals are consuming the available quantities of X and Y.

d.

Equilibrium has been achieved. The equilibrium involves an equilibrium in resource markets determining Jane's and Sarah's incomes, in the product market allocating L and K between X and Y, and the condition for efficiency in output that matches production to Jane and Sarah's preferences.

Diff: 2
Section: 16.2

85) Imagine a primitive society in which there are two goods: food and shelter. The utility functions for two representative members of the society, Jane and Paul, are given below.

Jane's utility function:

$$U^J = 25F^{0.5}S^{0.5}$$

Paul's utility function:

$$U^P = 50F^{0.75}S^{0.25}$$

where F = units of food, and S = units of shelter.

a. Determine the marginal rate of substitution for each individual.
b. The current prices of food and shelter are $12 and $6, respectively. Determine the proportions in which Jane and Paul should consume food and clothing to achieve an exchange equilibrium.

Answer: ***a.***

$$MRS^J_{FC} = \frac{MU_F}{MU_C} = \frac{12.5F^{-0.5}S^{0.5}}{12.5F^{0.5}S^{-0.5}}$$

$$MRS^J = \frac{S}{F}$$

$$MRS^P_{FC} = \frac{MU_F}{MU_C} = \frac{37.5F^{-0.25}S^{0.25}}{12.5F^{0.75}S^{-0.75}}$$

$$MRS^P = 3\frac{S}{F}$$

b.

Exchange equilibrium can be reached if both individuals equate their respective MRS to the ratio of the prices.

$$\frac{P_F}{P_C} = \frac{12}{6} = 2$$

$$MRS^J = \frac{S}{F} = 2$$

Jane should satisfy the condition: S = 2F.

$$MRS^P = 3\frac{S}{F} = 2$$

Paul should satisfy the condition:

$$S = \frac{2}{3}F$$

Diff: 2
Section: 16.2

86) Consider a potential, voluntary exchange between two people. Assume that both people have complete information about each other's preferences and that there are no transaction costs. Consumers A and B have between them 9 units of X and 15 units of Y. Initially, A has 6 of X and 10 of Y, and B has 3 of X and 5 of Y. Consumer A's marginal rate of substitution of X for Y is 2 and B's marginal rate of substitution of X for Y is 1/3. Is there room for a mutually beneficial, voluntary exchange? Determine which consumer would trade for more X and which consumer would trade for more Y. If trade takes place, can you explain the terms of trade?

Answer: To get one more unit of X, A is willing to give up at most two units of Y. To give up one unit of X, B needs to get at least 1/3 of a unit of Y. Thus, a mutually beneficial exchange can be made. A would trade to get more X and B would trade to get more Y, and both would be better off. The terms of trade depend upon the bargaining process but will be between 2 and 1/3. The amounts traded are determined by a point at which the two MRS are equal.

Diff: 2
Section: 16.2

87) Two individuals, Dave and Bob, consume two goods, X and Y. The utility functions for the two individuals are given as:

Bob's utility function:

$$U_B = 30X^{0.25}Y^{0.75}$$

Dave's utility function:

$$U_D = 50X^{0.5}Y^{0.5}$$

Bob is currently consuming 5 units of X and 10 units of Y. Dave is currently consuming 12 units of X and 8 units of Y. The current prices of X and Y are $10 and $15, respectively.

a. Determine the marginal rate of substitution for each individual.
b. In light of the information given above, have the two individuals achieved exchange equilibrium? Would it be possible to make one individual better off without harming the other? If the individuals have achieved exchange equilibrium, are other equilibrium combinations of X and Y between the individuals possible?

Answer: ***a.***

$$MRS^B = \frac{MU_X}{MU_Y} = \frac{7.5X^{-0.75}Y^{0.75}}{22.5X^{0.25}Y^{-0.25}}$$

$$MRS^b = \frac{1}{3}\frac{Y}{X}$$

$$MRS^D = \frac{MU_X}{MU_Y} = \frac{25X^{-0.50}Y^{0.50}}{25X^{0.50}Y^{-0.50}}$$

$$MRS^D = \frac{Y}{X}$$

b.

Exchange equilibrium requires that each individuals MRS be equated to the ratio of the prices.

$$\frac{P_X}{P_Y} = \frac{10}{15} = \frac{2}{3}$$

$$MRS^D = \frac{Y}{X} = \frac{2}{3}$$

Dave's equilibrium condition: Y = (2/3)x

$$MRS^B = \frac{1}{3}\frac{Y}{X} = \frac{2}{3}$$

Bob's equilibrium condition: Y = 2X
Bob is currently consuming 5 units of X and 10 units of Y which satisfies the condition Y = 2X.
Dave is currently consuming 12 units of X and 8 units of Y which satisfies the condition Y = (2/3)X.

The two individuals have achieved exchange equilibrium, so it would not be possible to make one better off without harming the other.

The exchange equilibrium is not unique. There are an infinite number of possibilities (assuming partial units) that can satisfy the conditions for equilibrium.

Diff: 2
Section: 16.2

88) Assume that two individuals, A and B, are willing to trade products X and Y. Before a possible trade, A has the following marginal rates of substitution of X for Y (or of Y for X):

$MRS_{XY}^{A} = 0.80$ (or equivalently, $MRS_{YX}^{A} = 1.25$).

Also, before a possible trade, B has these marginal rates of substitution of X for Y (or of Y for X):

$MRS_{XY}^{B} = 1.50$ (or equivalently, $MRS_{YX}^{B} = 0.67$).

Determine if trade can take place that would benefit either or both. If trade can benefit either or both, determine who will trade for what.

Answer: Trade is possible if the MRS_{XY}^{A} does not equal MRS_{XY}^{B}. In this problem, they are unequal; A is willing to give up up to 1.25 units of X to get one additional unit of Y, while B is willing to give up up to 1.5 units of Y to get one additional unit of X. Therefore A will trade X for Y while B trades Y for X. The exact terms of trade will be between 0.8 and 1.5 units of X for Y and will depend on the exact bargaining process.

Diff: 2
Section: 16.2

89) One day when Gilligan was diving in the lagoon he came across a gigantic oyster. Gilligan loved raw oysters so he pried the mollusk from the rocks and hastily came ashore. When he pried open the oyster he was surprised to find a huge gray pearl.

Gilligan was thrilled at the sight of the large pearl and his immediate thought was to go and tell his friends about it. But then he reconsidered. To whom would he give the pearl? He thought it was pretty, but owning the pearl would not give him any satisfaction. When he thought about it, he realized that the Skipper, Mr. and Mrs. Howell, the Professor, Ginger and MaryAnn would all like to have the pearl.

What should he do? He could not give the one pearl to all of his friends. Maybe he could find some more pearls. With this in mind he dove back into the lagoon and returned to the spot where he found the large oyster. Much to his surprise, barely hidden from view was a small colony of oysters. He pried each of them from the rocks and took them all ashore. Inside of each oyster he found a large pearl. Each pearl was as beautiful as the one that he had first discovered. When he had finished opening the oysters he counted his pearls. "One, two, three, four, five. That's it five pearls." But that's not enough. He did not need a pearl for himself, but he had six friends and only five pearls. Gilligan thought about this problem at least an hour. He finally stood and threw all five pearls back into the lagoon. "If everyone cannot have a pearl, then no one should have a pearl," he thought to himself as he watched the ripples from the pearls spread out across the lagoon.

a. Define Pareto optimality.
b. Was Gilligan's solution to his problem Pareto optimal? If so, explain why. If not, explain why not.

Answer: ***a.***
An allocation is Pareto optimal if there is no other allocation that makes at least one person better off and harms no one.

b.
Assuming that the utility functions of the island dwellers are not interdependent, then Gilligan's solution is not Pareto optimal. It would be better to allocate the pearls to anyone than to throw them away. If the utility functions are interdependent, his solution might have been Pareto optimal.

Diff: 2
Section: 16.3

90) Consider a competitive market in which people consume at the point where their marginal rates of substitution between products X and Y are 3/5. In this same market, producers produce where their marginal rates of transformation between X and Y are also 3/5. However, producers are producing 7 of Y and 3 of X, and consumers wish to consume 5 of Y and 5 of X per unit of time. Explain how this situation can exist. Also determine if it represents an equilibrium or not. If not an equilibrium, what will tend to happen in the market?

Answer: Because MRS = MRT, one would expect output efficiency. However, producers are not producing quantities of X and Y that equal the quantities of X and Y that consumers wish to purchase. In this case producers are producing more of Y and less of X than consumers wish to purchase. Prices in the market will adjust such that the price of Y will fall and the price of X will rise. This means that the ratio of prices P_X / P_Y increases, and the price line will move along the production frontier. An equilibrium results when the price ratio is $P_X^* > P_X$ and $P_Y^* < P_Y$. More of X will be produced and less Y will be produced. At the equilibrium, producers will be producing quantities of both X and Y that just equal the quantities being taken from the market by consumers. At the new equilibrium the new MRT* = MRS*, and the competitive equilibrium will be efficient.

Diff: 2
Section: 16.4

91) The United States and Mexico recently negotiated a trade agreement that eliminated many of the restrictions on trade between the two countries.

a. Using the tools of microeconomics, describe how such an agreement will benefit both the USA and Mexico.
b. Will everyone benefit from such an agreement? who stands to lose from such an agreement. Why?

Answer: ***a.***
See section 16.5 of text.

b.
Not everyone will benefit from the elimination of trade restrictions. The US and Mexico will tend to specialize in the industries for which they have a comparative advantage. Therefore, some US industries will expand while others will contract and likewise for Mexico. The workers in the contracting industries in each country will lose from such an agreement.

Diff: 2
Section: 16.5

92) On the planet Economus, there are only two goods in the economy. One of the goods is econoapples. The quantity supplied of econoapples is fixed at 30. The second type of good is the econoseed. The quantity supplied of econoseeds is fixed at 60. The demand for econoapples is: $Q_A^D = 15 - 2P_A + 4P_S$. The demand for econoseeds is: $Q_S^D = 45 + P_A - P_S$.

Determine the equilibrium price and quantity of each good in the Economus economy.

Answer: Market equilibrium for econoapples implies:

$Q_A^D = 30 \Rightarrow 15 - 2P_A + 4P_S = 30 \Leftrightarrow P_S = \frac{15 + 2P_A}{4}$. Market equilibrium for econoseeds implies: $Q_A^D = 60 \Rightarrow 45 + P_A - P_S = 60 \Leftrightarrow P_S = P_A - 15$. We can set this equation for the price of econoseeds equal to the equation for the price of econoseeds derived from the econoapples market. This yields:

$\frac{15 + 2P_A}{4} = P_A - 15 \Leftrightarrow 15 + 2P_A = 4P_A - 60 \Leftrightarrow P_A = 37.5$. This, in turn, implies the price of econoseeds is 22.50.

Diff: 2
Section: 16.6

93) On the planet Economus, there are only two goods in the economy. One of the goods is econoapples. The quantity supplied of econoapples is fixed at 30. The second type of good is the econoseed. The quantity supplied of econoseeds is fixed at 60. The demand for econoapples is: $Q_A^D = 15 - 2P_A + 4P_S$. The demand for econoseeds is: $Q_S^D = 45 + P_A - P_S$. If the Economus world government institutes a tax of \$1 on the price of econoapples, what is the effect on the amount econoapple consumers pay? Determine the equilibrium price and quantity of each good in the Economus economy.

Answer: Market equilibrium for econoapples implies:

$Q_A^D = 30 \Rightarrow 15 - 2(P_A + 1) + 4P_S = 30 \Leftrightarrow P_S = \frac{15 + 2(P_A + 1)}{4} = \frac{17 + 2P_A}{4}$. Market equilibrium for econoseeds implies:

$Q_A^D = 60 \Rightarrow 45 + (P_A + 1) - P_S = 60 \Leftrightarrow P_S = P_A - 14$. We can set this equation for the price of econoseeds equal to the equation for the price of econoseeds derived from the econoapples market. This yields:

$\frac{17 + 2P_A}{4} = P_A - 14 \Leftrightarrow 17 + 2P_A = 4P_A - 56 \Leftrightarrow P_A = 36.5$. This, in turn, implies the price of econoseeds is 22.50. The consumers of econoapples must pay the \$36.50 price plus the \$1 tax to consume one econoapple. Thus, the total cost of purchasing an econoapple is \$37.50. Since supply of econoapples is perfectly inelastic, econoapple consumers share none of the burden of the tax.

Diff: 3
Section: 16.6

94) On the planet Economus, there are only two goods in the economy. One of the goods is econoapples. The supply of econoapples is: $Q_A^S = 30 + P_A - \frac{1}{2}P_S$. The second type of good is the econoseed. The supply of econoseeds is: $Q_S^S = 60 - P_A + P_S$. The demand for econoapples is: $Q_A^D = 15 - 2P_A + 4P_S$. The demand for econoseeds is: $Q_S^D = 45 + P_A - P_S$. Determine the equilibrium price and quantity of each good in the Economus economy. Suppose the world government of Economus implements a $1 tax on econoapples. Do econoapple consumers suffer any burden of the tax? Are econoseed consumers affected by the econoapple tax? How much tax revenue does the tax policy generate?

Answer: Equilibrium in the Econoapple market mandates that:

$Q_A^S = Q_A^D \Rightarrow 30 + P_A - \frac{1}{2}P_S = 15 - 2P_A + 4P_S \Leftrightarrow \frac{2}{9}(3P_A + 15)$. Equilibrium in the Econoseed market dictates that:

$Q_S^S = Q_S^D \Rightarrow 60 - P_A + P_S = 45 + P_A - P_S \Leftrightarrow P_S = P_A - 7.5$. We can set this equation for the price of econoseeds equal to the equation for the price of econoseeds derived from the econoapples market. This yields:

$\frac{2}{9}(3P_A + 15) = P_A - 7.5 \Leftrightarrow \frac{1}{3}P_A = \frac{195}{18} \Leftrightarrow P_A = 32.5$. This, in turn, implies the price of econoseeds is 25. If the world government of Economus implements a $1 tax on apples, the new market equilibrium conditions change as follows. Equilibrium in the Econoapple market mandates that:

$Q_A^S = Q_A^D \Rightarrow 30 + P_A - \frac{1}{2}P_S = 15 - 2(P_A + 1) + 4P_S \Leftrightarrow P_S = \frac{2}{9}(3P_A + 17)$. Equilibrium in the Econoseed market dictates that:

$Q_S^S = Q_S^D \Rightarrow 60 - P_A + P_S = 45 + (P_A + 1) - P_S \Leftrightarrow P_S = P_A - 7$. We can set this equation for the price of econoseeds equal to the equation for the price of econoseeds derived from the econoapples market. This yields:

$\frac{2}{9}(3P_A + 17) = P_A - 7 \Leftrightarrow \frac{1}{3}P_A = \frac{97}{9} \Leftrightarrow P_A = 32\frac{1}{3}$. This, in turn, implies the price of econoseeds is $25\frac{1}{3}$. The consumer's of econoapples must pay the price of $32.33 plus the $1 tax. Thus, consumers pay $\frac{5}{6}$ of the $1 tax on econoapples. Note also that econoseed consumers suffer as a result of the tax on econoapples as the market price of econoseeds has risen. The econoapples tax generates $37 in tax revenue.

Diff: 3
Section: 16.6

95) On the planet Economus, there are only two goods in the economy. One of the goods is econoapples. The supply of econoapples is: $Q_A^S = 30 + P_A - \frac{1}{2}P_S$. The second type of good is the econoseed. The supply of econoseeds is: $Q_S^S = 60 - P_A + P_S$. The demand for econoapples is: $Q_A^D = 15 - P_A + 4P_S$. The demand for econoseeds is: $Q_S^D = 45 + P_A - P_S$. Determine the equilibrium price and quantity of each good in the Economus economy. Suppose the world government of Economus implements a $1 tax on econoapples. Do econoapple consumers suffer any burden of the tax? Are econoseed consumers affected by the econoapple tax? How much tax revenue does the tax policy generate?

Answer: Equilibrium in the Econoapple market mandates that:

$Q_A^S = Q_A^D \Rightarrow 30 + P_A - \frac{1}{2}P_S = 15 - P_A + 4P_S \Leftrightarrow P_S = \frac{4}{9}P_A + \frac{30}{9}$. Equilibrium in the Econoseed market dictates that:

$Q_S^S = Q_S^D \Rightarrow 60 - P_A + P_S = 45 + P_A - P_S \Leftrightarrow P_S = P_A - 7.5$. We can set this equation for the price of econoseeds equal to the equation for the price of econoseeds derived from the econoapples market. This yields:

$\frac{4}{9}P_A + \frac{30}{9} = P_A - 7.5 \Leftrightarrow \frac{5}{9}P_A = \frac{195}{18} \Leftrightarrow P_A = 19.5$. This, in turn, implies the price of econoseeds is 12. If the world government of Economus implements a $1 tax on econoapples, the new market equilibrium conditions change as follows. Equilibrium in the Econoapple market mandates that:

$Q_A^S = Q_A^D \Rightarrow 30 + P_A - \frac{1}{2}P_S = 15 - \left(P_A + 1\right) + 4P_S \Leftrightarrow P_S = \frac{4}{9}P_A + \frac{32}{9}$. Equilibrium in the Econoseed market dictates that:

$Q_S^S = Q_S^D \Rightarrow 60 - P_A + P_S = 45 + \left(P_A + 1\right) - P_S \Leftrightarrow P_S = P_A - 7$. We can set this equation for the price of econoseeds equal to the equation for the price of econoseeds derived from the econoapples market. This yields:

$\frac{4}{9}P_A + \frac{32}{9} = P_A - 7 \Leftrightarrow \frac{5}{9}P_A = \frac{95}{9} \Leftrightarrow P_A = 19$. This, in turn, implies the price of econoseeds is $12. The consumer's of econoapples must pay the price of $19 plus the $1 tax. Thus, consumers pay 50% of the $1 tax on econoapples. Note also that econoseed consumers are not affected by the tax on econoapples as the market price of econoseeds has not changed. The econoapples tax generates $43 in tax revenue.

Diff: 2
Section: 16.6

96) Residents in the city of Econoville enjoy only two types of recreational activities. The activities are biking and attending concerts. The supply of concert tickets is: $Q_C^S = 60{,}000$. The demand for concert tickets is: $Q_C^D = 90{,}000 - 1{,}000P_C + P_B$. The supply of biking trail permits is set at: $Q_B^S = 150{,}000$. The demand for biking trail permits is $Q_B^D = 250{,}000 - 1{,}000P_B + 20P_C$. Determine the general equilibrium prices and quantities for the two recreational activities.

Answer: Equilibrium in the concert market mandates that:

$Q_C^S = Q_C^D \Rightarrow 60{,}000 = 90{,}000 - 1{,}000P_C + P_B \Leftrightarrow P_B = 1{,}000P_C - 30{,}000$. Equilibrium in the biking permit market dictates that:

$Q_B^S = Q_B^D \Rightarrow 150{,}000 = 250{,}000 - 1{,}000P_B + 20P_C \Leftrightarrow P_B = 100 + \frac{2}{100}P_C$. We can set this equation for the price of biking permits equal to the equation for the price of biking permits derived from the concert market. This yields:

$1{,}000P_C - 30{,}000 = 100 + \frac{2P_C}{100} \Leftrightarrow P_C = \frac{3{,}010{,}000}{99{,}998} \approx 30.10$. This, in turn, implies the price of biking permits is \$100.60. The equilibrium quantity of concert tickets is 60,000 and the equilibrium quantity of biking permits is 150,000.

Diff: 2
Section: 16.6

97) Residents in the city of Econoville enjoy only two types of recreational activities. The activities are biking and attending concerts. The demand for concert tickets is: $Q_C^D = 90{,}000 - 1{,}000P_C + P_B$. The supply of biking trail permits is set at: $Q_B^S = 150{,}000$. The demand for biking trail permits is $Q_B^D = 250{,}000 - 1{,}000P_B + 20P_C$. The city wishes to expand seating capacity at concert events. To finance the concert hall expansion, the city is considering a tax of $5 per ticket. Given that the city institutes this plan, the supply of concert tickets will become $Q_C^S = 75{,}000$. Before the expansion of the concert hall, the supply of concert tickets was fixed at 60,000. What is the effect on equilibrium prices of the additional seating capacity and the $5 tax? How much revenue does the tax generate? Did concert ticket revenue increase due to adding seating capacity and the tax?

Answer: Before the concert hall expansion and tax, equilibrium in the concert market mandates that:

$Q_C^S = Q_C^D \Rightarrow 60{,}000 = 90{,}000 - 1{,}000P_C + P_B \Leftrightarrow P_B = 1{,}000P_C - 30{,}000$. Equilibrium in the biking permit market dictates that:

$Q_B^S = Q_B^D \Rightarrow 150{,}000 = 250{,}000 - 1{,}000P_B + 20P_C \Leftrightarrow P_B = 100 + \frac{2}{100}P_C$. We can set this equation for the price of biking permits equal to the equation for the price of biking permits derived from the concert market. This yields:

$1{,}000P_C - 30{,}000 = 100 + \frac{2P_C}{100} \Leftrightarrow P_C = \frac{3{,}010{,}000}{99{,}998} \approx 30.10$. This, in turn, implies the price of biking permits is $100.60. If the local government expands the concert hall and implements a tax, equilibrium in the concert market requires:

$Q_C^S = Q_C^D \Rightarrow 75{,}000 = 90{,}000 - 1{,}000\left(P_C + 5\right) + P_B \Leftrightarrow P_B = 1{,}000P_C - 10{,}000.$

Equilibrium in the biking permit market dictates that:

$Q_B^S = Q_B^D \Rightarrow 150{,}000 = 250{,}000 - 1{,}000P_B + 20\left(P_C + 5\right) \Leftrightarrow P_B = 100.1 + \frac{2}{100}P_C$. We can set this equation for the price of biking permits equal to the equation for the price of biking permits derived from the concert market. This yields:

$1{,}000P_C - 10{,}000 = 100.1 + \frac{2P_C}{100} \Leftrightarrow P_C = \frac{1{,}010{,}000}{99{,}998} \approx 10.10$. Concert goers pay the $10.10 price plus the $5 tax. This, in turn, implies the price of biking permits is $100.30. Even with the tax, the additional seating capacity of the concert hall nearly reduces the cost of a concert ticket by 50%. The equilibrium price of biking permits falls by $0.30. The concert ticket tax generates $375,000 in tax revenue. The concert ticket revenue with the additional seating capacity and the tax is $757,500. Before the concert expansion, concert ticket revenues were $1,806,000. This implies that ticket revenue has declined as a result of the added seating capacity.

Diff: 3
Section: 16.6

98) Residents in the city of Econoville enjoy only two types of recreational activities. The activities are biking and attending concerts. The demand for concert tickets is: $Q_C^D = 90{,}000 - 1{,}000P_C + P_B$. The supply of biking trail permits is set at: $Q_B^S = 150{,}000$. The demand for biking trail permits is $Q_B^D = 250{,}000 - 1{,}000P_B + 20P_C$. The city wishes to expand seating capacity at concert events. To finance the concert hall expansion, the city is considering a tax of $20 on biking permits. Given the city institutes this plan, the supply of concert tickets will become $Q_C^S = 75{,}000$. Before the expansion of the concert hall, the supply of concert tickets was fixed at 60,000. What is the effect on equilibrium prices of the additional seating capacity and the $20 tax on biking permits? How much revenue does the tax generate? Did concert ticket revenue increase due to adding seating capacity and the tax?

Answer: Before the concert hall expansion and tax, equilibrium in the concert market mandates that:

$Q_C^S = Q_C^D \Rightarrow 60{,}000 = 90{,}000 - 1{,}000P_C + P_B \Leftrightarrow P_B = 1{,}000P_C - 30{,}000$. Equilibrium in the biking permit market dictates that:

$Q_B^S = Q_B^D \Rightarrow 150{,}000 = 250{,}000 - 1{,}000P_B + 20P_C \Leftrightarrow P_B = 100 + \frac{2}{100}P_C$. We can set this equation for the price of biking permits equal to the equation for the price of biking permits derived from the concert market. This yields:

$1{,}000P_C - 30{,}000 = 100 + \frac{2P_C}{100} \Leftrightarrow P_C = \frac{3{,}010{,}000}{99{,}998} \approx 30.10$. This, in turn, implies the price of biking permits is $100.60. If the local government expands the concert hall and implements a tax, equilibrium in the concert market requires:

$Q_C^S = Q_C^D \Rightarrow 75{,}000 = 90{,}000 - 1{,}000P_C + \left(P_B + 20\right) \Leftrightarrow P_B = 1{,}000P_C - 15{,}020.$

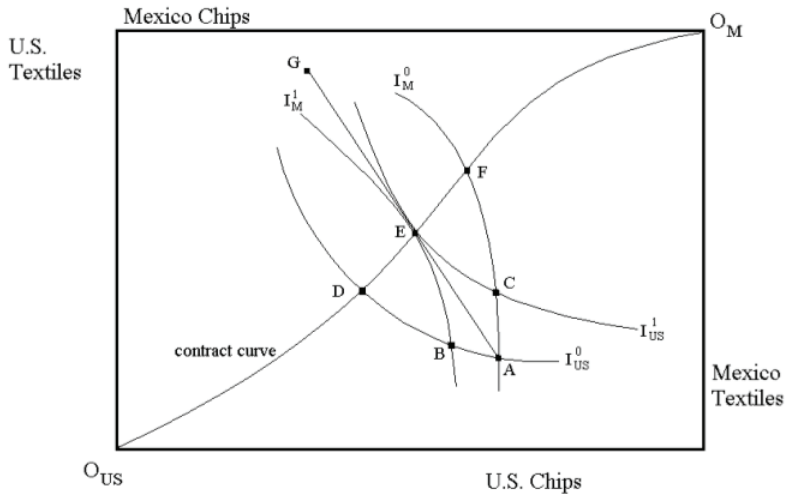
Equilibrium in the biking permit market dictates that:

$Q_B^S = Q_B^D \Rightarrow 150{,}000 = 250{,}000 - 1{,}000\left(P_B + 20\right) + 20P_C \Leftrightarrow P_B = 80 + \frac{2}{100}P_C$. We can set this equation for the price of biking permits equal to the equation for the price of biking permits derived from the concert market. This yields:

$1{,}000P_C - 15{,}020 = 80 + \frac{2P_C}{100} \Leftrightarrow P_C = \frac{1{,}510{,}000}{99{,}998} \approx 15.10$. This, in turn, implies the price of biking permits is $80.30. The equilibrium price of biking permits falls by $20.30. However, consumers must also pay the $20 tax. The actual cost of a biking permit is the price $80.30 plus the $20 tax. The actual cost of biking permits has fallen $0.30 with the tax. The biking permit tax generates $3,000,000 in tax revenue. Biking permit revenue, however, has fallen to $12,045,000 from $15,090,000 before the tax and concert hall expansion.

Diff: 3
Section: 16.6

99) Refer to the diagram below to answer this question.

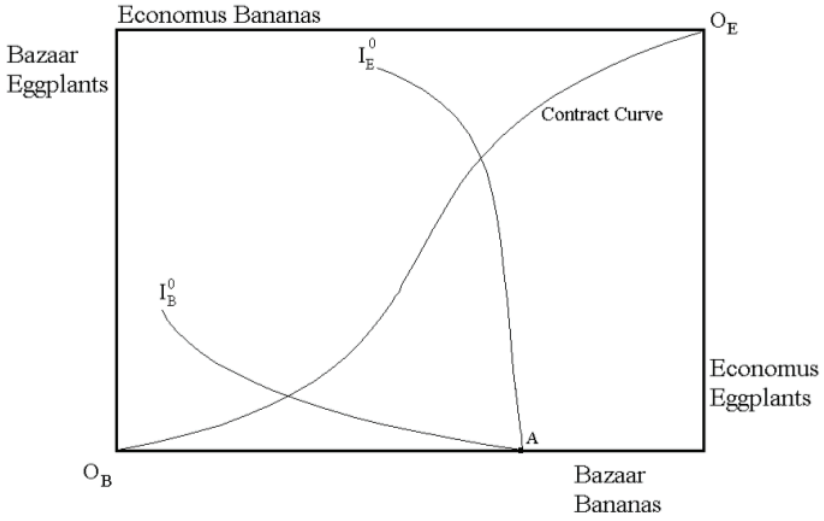


Suppose the Edgeworth box diagram above pertains to trade between Mexico and the U.S. Before the ratification of the North American Free Trade Agreement (NAFTA), the consumption of computer chips and textiles in both countries is given by point *A*. At point *A*, what is true regarding the relative price of computer chips in the U.S. versus Mexico? If the ratification of NAFTA allows trade to bring about the efficient equilibrium, which point in the diagram indicates the level of consumption by each country? At the new equilibrium, what has happened to the price of chips in the U.S.? How do we know both countries are better off by free trade?

Answer: At point *A*, the price of computer chips in the U.S. is relatively low when compared to Mexico. The price of textiles in the U.S. is relatively high when compared to Mexico. If NAFTA allows the two countries to trade, the efficient equilibrium is point *E*. The price ratio for trade between the countries is given as line segment *AG*. At the new equilibrium, the price of chips in the U.S. has gone up while the price of textiles has gone down. The opposite is true in Mexico. We know that both countries are made better off by free trade because they each attain an indifference curve that provides greater utility. That is, the U.S. is on indifference curve I_{US}^1 at the equilibrium point which provides more utility than $I_{US.}^0$ Mexico is on indifference curve I_M^1 at the equilibrium point which provides more utility than I_M^0. Thus, both countries are strictly better off by the movement from point *A* to point *E*.

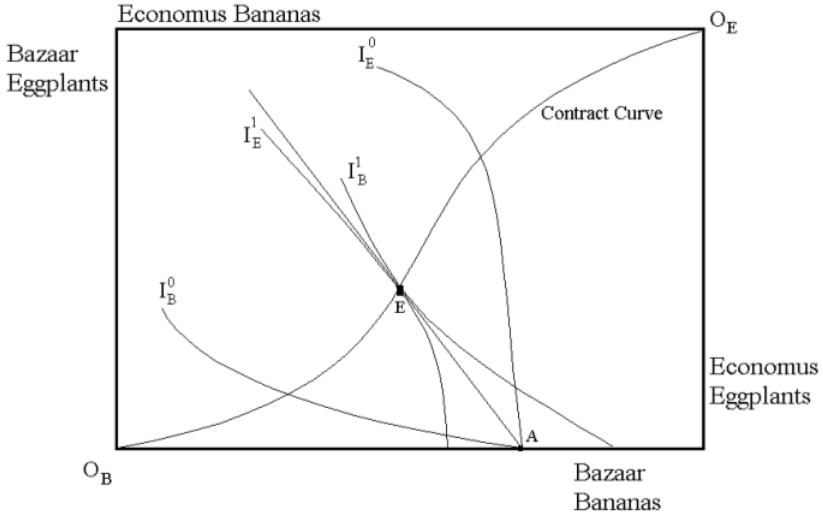
Diff: 2
Section: 16.5

100) Refer to the diagram below to answer this question.



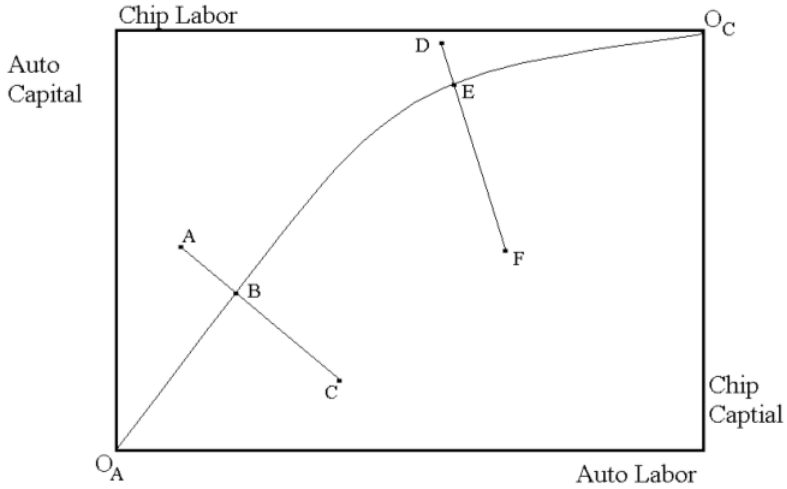
The Edgeworth box diagram above reflects preferences and availability of goods on the two planets Bazaar and Economus. Bananas are only produced on the planet Bazaar while Eggplants are only produced on Economus. Due to the inability to transport goods between the two planets, the current consumption is indicated by point A. What is true about consumers' willingness–to–pay for Eggplants on Bazaar versus the planet Economus? Suppose that due to technological advances on both planets, the two planets may trade costlessly. What is likely to happen? Indicate the changes in the diagram above. Do the planets benefit by trading?

Answer: On Bazaar consumers are willing to give up more bananas to gain an additional eggplant than consumers on Economus. If trade can take place between planets, the planet Bazaar would be willing to give up bananas for eggplants while the planet of Economus is willing to give up eggplants for bananas. The new consumption point for both planets is given below as point *E*. At the equilibrium point with trade, the planet Bazaar is now consuming more eggplants and fewer bananas. The planet Economus is now consuming fewer eggplants and more bananas. The trade opportunity has allowed both planets to become better off as they have each attained an indifference curve bringing higher utility.

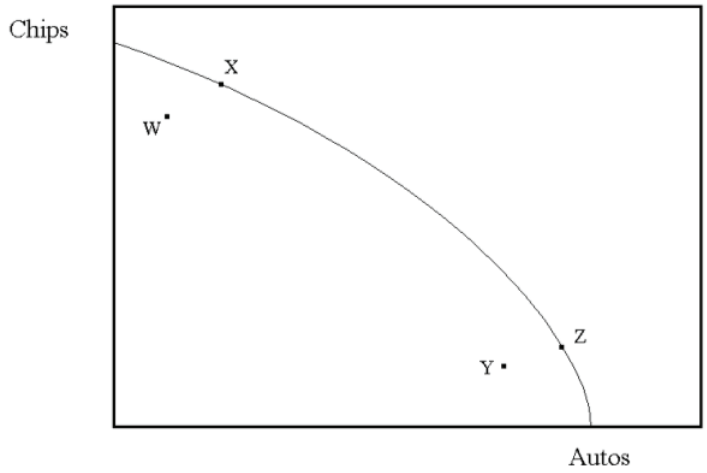


Diff: 3
Section: 16.5

101) Refer to the diagram below to answer this question.



The Edgeworth Box diagram above refers to input usage in the automobile industry and the computer chip industry. The contract curve is given by $O_A O_C$. All points on this curve correspond to input prices being equivalent across industries. For example, the line segment *AC* indicates the input price ratio at point *B* in the two industries. Also, line segment *DF* indicates the input price ratio at point *E* in the two industries. The diagram below presents the production possibilities frontier for automobiles and computer chips.



The labeled points in the production possibilities frontier diagram correspond to the points *A*, *B*, *E*, and *F* in the Edgeworth Box diagram above. Which points in the production possibilities frontier diagram correspond to which points in the Edgeworth Box diagram? Why?

Answer: Point *A* must correspond to point *W*. We know that point *A* is not an efficient production level because the input prices are not equal across industries. Further, we know that point *A* provides smaller output of automobiles than point *B*. In fact, point *A* must provide the smallest automobile production than all points labeled in the PPF. This is because the automobile industry is using the least amount of inputs at this point. Point *B* must correspond to point *X*. We know that point *B* is efficient and must lie on the production possibilities frontier because input prices are equal across industries. We also know that automobile production at point *B* must be below automobile production at point *E*. This implies that point *B* corresponds to point *X*. Point *E* must

correspond to point *Y*. We know that point *E* is efficient, as input prices are equal across the two industries. Also, point *E* provides for greater automobile production than point *B*. Thus, point *E* corresponds to point *Y*. This means point *F* corresponds to point *Z*.

Diff: 2
Section: 16.6

102) Germany and France can produce the amounts of wine and beer indicated in the table below with one unit of land. Each country has 10 units of land. Does either country have an absolute advantage? Which country has a comparative advantage in beer production? Which country has a comparative advantage in wine production? Is it possible for the two countries to benefit from trade?

Country	Beer	Wine
France	2	4
Germany	10	1

Answer: With 10 units of land, Germany can produce 100 units of beer while France may only produce 20 units of beer. However, with 10 units of land, Germany may only produce 10 units of wine while France can produce 40 units of wine. Therefore Germany has an absolute advantage in beer, and France has an absolute advantage in wine. In Germany, the opportunity cost of beer is 0.1 units of wine. In France, the opportunity cost of beer is 2 units of wine. This implies that Germany has a comparative advantage in beer production. In France, the opportunity cost of wine is 0.5 units of beer in France. In Germany, the opportunity cost of wine is 10 units of beer. This implies that France has a comparative advantage in wine production. Depending upon preferences of the two countries, free trade may be beneficial. For example, if Germans were willing to exchange 4 units of beer for 1 unit of wine and the French were willing to exchange 1 unit of wine for 4 units of beer, both countries would be made better off by trade. As long as the cost of beer in terms of wine is between (0.1,0.5), the countries would be better off by trading.

Diff: 2
Section: 16.5

103) The U.S. and Mexico can produce the amounts of computer chips and textiles indicated in the table below with one unit of land. Each country has 10 units of land. Does either country have an absolute advantage? Which country has a comparative advantage in chip production? Which country has a comparative advantage in textile production? Is it possible for the two countries to benefit from trade?

Country	Chips	Textiles
U.S.	1,000	100
Mexico	300	50

Answer: With 10 units of land, the U.S. can produce 10,000 units of chips while Mexico may only produce 3,000 units of chips. With 10 units of land, the U.S. can produce 1,000 units of textiles while Mexico can only produce 500 units of textiles. This implies that the U.S. has an absolute advantage in both goods as it can produce more of both goods. In the U.S., the opportunity cost of chips is 0.1 units of textiles. In Mexico, the opportunity cost of chips is $\frac{1}{6}$ units of textiles. This implies that the U.S. has a comparative advantage in chip production. In Mexico, the opportunity cost of textiles is 6 units of chips. In the U.S., the opportunity cost of textiles is 10 units of chips. This implies that Mexico has a comparative advantage in textile production. Depending upon preferences of the two countries, free trade may be beneficial. For example, if Americans were willing to exchange 8 units of chips for 1 unit of textiles and Mexicans were willing to exchange 1 unit of textiles for 8 units of chips, both countries would be made better off by trade. As long as the cost of chips in terms of textiles is between $\left(\frac{1}{10}, \frac{1}{6}\right)$ the countries would be better off by trading.

Diff: 2
Section: 16.5

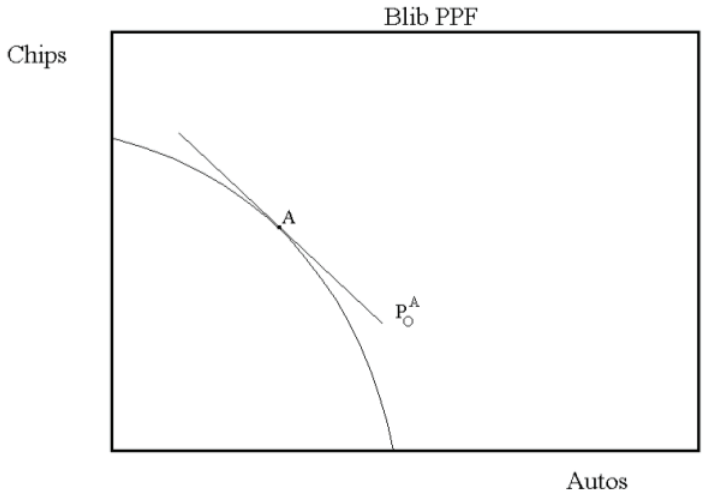
104) On planet Economus, the countries Blib and Flib can produce the amounts of string and rope indicated in the table below with one unit of land. The country of Blib has 20 units of land available while the country of Flib has 10 units of land. Does either country have an absolute advantage? Which country has a comparative advantage in string production? Which country has a comparative advantage in rope production? Is it possible for the two countries to benefit from trade?

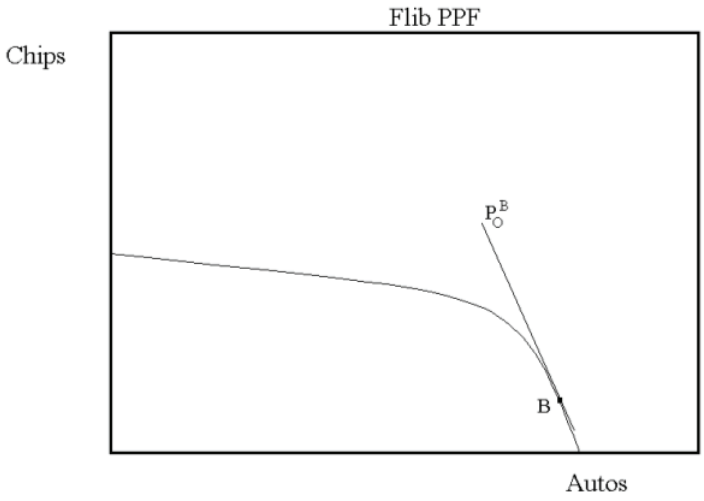
Country	String	Rope
Blib	10	20
Flib	25	10

Answer: With 20 units of land, Blib can produce 200 units of string, while Flib can produce 250 units of string with its 10 units of land. With 20 units of land, Blib can produce 400 units of rope, while Flib can only produce 100 units of rope with its 10 units of land. This implies that Blib has an absolute advantage in rope and Flib has an absolute advantage in string. Moreover, in Blib, the opportunity cost of string is 2 units of rope. In Flib, the opportunity cost of string is 0.4 units of rope. This implies that Flib has a comparative advantage in string production. In Flib, the opportunity cost of rope is 2.5 units of string. In Blib, the opportunity cost of rope is 0.5 units of string. This implies that Blib has a comparative advantage in rope production. Depending upon preferences of the two countries, free trade may be beneficial. For example, if Blibians were willing to exchange 1 rope for 1 string and Flibians were willing to exchange 1 string for 1 rope, both countries would be made better off by trade. As long as the cost of string in terms of rope is between $\left(\frac{2}{5}, 2\right)$, the countries would be better off by trading.

Diff: 2
Section: 16.5

105) Refer to the following two diagrams to answer this question.





The production possibilities frontier for Autos and Chips are given above for the two countries Blib and Flib. Initially, there is no trade between Blib and Flib. As a result, Blib is maximizing societal welfare by producing and consuming at point A. Flib is maximizing societal welfare by producing and consuming at point B. The ratio of prices in Blib is given by line P_A^O while the ratio of prices in Flib is given by line P_B^O. What is true about the relative price of Autos in Blib versus Flib? Explain how it may be possible for both countries to be made better off by trading Autos for Chips.

Answer: The price ratio line P_B^O is steeper than P_A^O. This implies that Flibians must give up more Chips to gain additional Autos than Blibians. That is, Autos are relatively more expensive in Flib than in Blib. Any price ratio whose slope is between $\left(P_B^O, P_A^O\right)$ will bring about trade that makes both countries better off. Any price ratio in this range will encourage Flibians to manufacture more chips and fewer autos while Blibians will

produce more autos and fewer chips. Through trade, Blibians and Flibians may end up consuming more of both goods. Thus, we know both countries will be better off by free trade.

Diff: 3
Section: 16.5

Chapter 17 Markets with Asymmetric Information

1) Used cars sell for much less than new cars because
   A) of imperfect competition in the automobile industry.
   B) buyers know much more about the quality of used cars than sellers do.
   C) sellers know much more about the quality of used cars than buyers do.
   D) physical depreciation of used cars is very high.
   E) of licensing arrangements by the government.

   Answer: C
   Diff: 1
   Section: 17.1

2) The problem of adverse selection in insurance results in a situation in which
   A) people choose inappropriate or inadequate coverage because they do not understand the complex information in the policies.
   B) people choose too much coverage because they do not understand the complex information in the policies.
   C) people choose too little coverage because they do not understand the complex information in the policies.
   D) unhealthy people become more likely to buy insurance than healthy people, which drives premiums up, which drives even more healthy people away from the market.
   E) healthy people become more likely to buy insurance than unhealthy people, which drives premiums up, which drives even more unhealthy people away from the market even though they are the ones who need it most.

   Answer: D
   Diff: 1
   Section: 17.1

3) Julia is a 28–year–old nonsmoking, non–drinking female of normal weight. Because of adverse selection in health insurance,
   A) She will be charged less for her premiums than people who are higher risks.
   B) She is less likely to buy health insurance than the average person, because policy premiums are based on expected medical expenditures of people who are less healthy than she is.
   C) When she get health insurance, she will be less likely to take care of herself.
   D) She must get health insurance early in life, and is likely to lose health insurance if she smokes, drinks to excess, or gains weight.
   E) She is more likely than the average person to buy health insurance, because she is more likely to be offered it.

   Answer: B
   Diff: 2
   Section: 17.1

4) John is a 55–year–old male smoker, about 50 pounds overweight, who has high blood sugar and drinks to excess a couple of times each month. Because of adverse selection in health insurance,
   A) John is less likely to buy health insurance than the average person, because the average person's policy premiums will be based on his risk, not the average risk.
   B) John is more likely to buy health insurance than the average person, because his policy premiums will be based on the average risk, not his personal risk.
   C) when John gets health insurance, he will be less likely to take care of himself.
   D) when John gets health insurance, he will be more likely to take care of himself.
   E) if John doesn't have health insurance already, he will not be able to get it.

Answer: B
Diff: 2
Section: 17.1

5) The problem of adverse selection in health insurance leads to a situation in which
   A) health insurance covers inappropriate items for the population it serves.
   B) overinsurance of the premium–paying population occurs.
   C) underinsurance of the premium–paying population occurs.
   D) the percentage of the premium–paying population that is healthy rises, squeezing unhealthy individuals out of the market.
   E) the percentage of the premium–paying population that is unhealthy rises, squeezing healthy individuals out of the market.

Answer: E
Diff: 1
Section: 17.1

6) When sellers have more information about products than buyers do, we would expect
   A) sellers to get higher prices for their goods than they could otherwise.
   B) buyers to pay lower prices for goods than they would otherwise.
   C) high–quality goods to drive low–quality goods out of the market.
   D) low–quality goods to drive high–quality goods out of the market.

Answer: D
Diff: 2
Section: 17.1

7) Assume that both high and low quality appliances are sold in the used appliance market. If we assume asymmetric information with sellers having more information regarding quality than buyers, which of the following is necessarily true? The
   A) fraction of high quality appliances will be greater than under perfect knowledge.
   B) fractions of high and low quality appliances will be the same as with perfect information.
   C) fraction of high quality appliances will be less than with perfect information.
   D) none of the above

Answer: C
Diff: 2
Section: 17.1

8) Consider a market in which high-quality and low-quality television sets are sold. Before consumers make a purchase, they do not know the quality of the sets, but the sellers do know. As compared to a situation where both consumers and sellers know the quality of the sets, this situation would
   A) cause no change in the ratio of low to high-quality sets sold.
   B) increase the fraction of high-quality sets sold.
   C) increase the fraction of low-quality sets sold.
   D) cause the average price of goods sold to rise.

Answer: C
Diff: 2
Section: 17.1

9) Which of the following represent examples of adverse selection?
   A) Unhealthy people are more likely to want health insurance.
   B) Careless drivers purchasing extra auto insurance.
   C) Risk averse individuals choosing to buy extra insurance.
   D) all of the above
   E) A and B only

Answer: E
Diff: 2
Section: 17.1

10) Assume that a particular state has decided to outlaw the sharing of individuals' credit histories as an illegal invasion of privacy. As a result of this action we would expect the
   A) cost of borrowing money to rise.
   B) number of loans to unworthy credit risks to rise.
   C) problems of asymmetric information to become more severe.
   D) all of the above
   E) none of the above

Answer: D
Diff: 2
Section: 17.1

11) Augustus bought his BMW convertible as a new car in 1998 and knows that it is in excellent condition. He now wants to sell it and knows that there are many other similar cars on the used car market that are lemons. As a result:
   A) he should be able to sell my car at a premium price because of its excellent condition.
   B) he will have to accept a lower price for his car because buyers might think that it is a lemon.
   C) he will not be able to sell his car unless he offers some sort of guarantee.
   D) he will get the best price for his car by selling it to a dealer.

Answer: B
Diff: 2
Section: 17.1

12) When states make car insurance mandatory for all drivers, it
A) raises rates for everyone because it brings bad drivers into the pool.
B) raises rates for high–risk drivers.
C) may lower rates for all drivers to the extent that it keeps low–risk drivers in the pool.
D) prevents high–risk drivers from "selecting out," to the detriment of low–risk drivers.
E) increases the amount of information available to insurers about the population.

Answer: C
Diff: 2
Section: 17.1

13) When firms participate in group health insurance for all employees, it
A) raises rates for everyone, because it brings unhealthy people into the pool.
B) raises rates for unhealthy people.
C) may lower rates for all people to the extent that it keeps healthy people in the pool.
D) prevents unhealthy people from "selecting out," to the detriment of healthy people.
E) increases the amount of information available to insurers about the population.

Answer: C
Diff: 2
Section: 17.1

14) Credit histories allow firms to
A) identify high–risk borrowers, so they can be eliminated and interest rates kept down for others.
B) increase the number of credit cards issued, and interest rates go up as a result.
C) increase the number of credit cards issued, and interest rates go down as a result.
D) lower the number of credit cards issued, and interest rates go up as a result.
E) increase market power in the credit card industry, raising interest rates.

Answer: A
Diff: 1
Section: 17.1

15) Medical histories used by insurance firms allow them to
A) identify high–risk people, so they can be denied insurance and premiums kept down for low risk people.
B) increase the number of policies issued, raising premiums as a result.
C) increase the number of policies issued, lowering premiums as a result.
D) lower the number of policies issued, raising premiums.
E) increase market power in the insurance industry, raising premiums.

Answer: A
Diff: 2
Section: 17.1

16) In the arena of asymmetric information, standardization (for example, menus at McDonald's restaurants) is a substitute for
A) quality.
B) government regulation.
C) reputation of individual sellers.
D) firms' distinguishing among buyers.
E) firms' segregation of buyers.

Answer: C
Diff: 1
Section: 17.1

17) You want to add a new room on your house, but you are not familiar with the local building contractors and are not sure who to consider for the job. If you ask your friends for referrals, you are using their past experience as a way to evaluate the _____ of the builders.
A) efficiency wages
B) moral hazard
C) asymmetric information
D) reputation

Answer: D
Diff: 1
Section: 17.1

18) When asymmetric information problems drive high quality products from a market, we refer to this situation as:
A) adverse selection.
B) moral hazard.
C) a lemons problem.
D) A and C are correct.
E) B and C are correct.

Answer: D
Diff: 1
Section: 17.1

19) How do online auction sites like Ebay attempt to overcome the asymmetric information problems associated with goods that the buyer cannot personally inspect before purchase?
A) The online auction firm only allows high–quality merchandise to be sold at their site.
B) The previous performance (reputations) of the buyer and seller are posted for public review.
C) Buyers can take receipt of any goods before they have to pay the seller.
D) all of the above

Answer: B
Diff: 1
Section: 17.1

20) If grades are to be a successful signal to potential employers of a student's qualities, then higher grades must be
A) easier for high–productivity students to earn than for low–productivity students to earn.
B) easier for low–productivity students to earn than for high–productivity students to earn.
C) easy for employers to check.
D) used for all future promotions within the firm.
E) often referred to in the hiring process.

Answer: A
Diff: 1
Section: 17.2

21) The completion of a degree or course of study is a good labor market signal
A) only if what is learned in that educational process relates directly to the job the individual is being considered for.
B) only if there is a positive correlation between academic success and wage income.
C) primarily because individuals develop good habits in college that serve them well in other areas later on.
D) because all individuals have the opportunity (in the United States) to pursue higher education.
E) because people who possess the traits that make them more productive in the workplace have an easier time completing an education than those who don't.

Answer: E
Diff: 1
Section: 17.2

22) Which of the following statements is NOT a reason that the cost of a college education is greater for the low–productivity group than for the high–productivity group?
A) The wages they give up by going to college instead of working will tend to be higher for them.
B) They may have to pay for tutoring services or other extra help to accomplish the same educational goal.
C) They may have to take remedial classes, which would increase the length of time it takes to accomplish the same goal.
D) Even if they take no remedial classes, they may have to spend more time studying for each class, and the value of their leisure time needs to be considered in the calculation.
E) Based on previous signaling, such as from their high school grades or SATs, they may receive less merit–based financial assistance, and thus be under a greater financial strain during their college years.

Answer: A
Diff: 2
Section: 17.2

Scenario 17.1

Consider the information below:

For Group A the cost of attaining an educational level y is

$C_A(y) = \$6{,}000y$

and for Group B the cost of attaining that level is

$C_B(y) = \$10{,}000y.$

Employees will be offered \$50,000 if they have $y < y^*$, where y^* is an education threshold determined by the employer. They will be offered \$130,000 if they have $y > y^*$.

23) Refer to Scenario 17.1. The highest level of y* that can be set and still have the high–productivity people choose to meet it is

A) 16. B) 13 1/3. C) 13. D) 8. E) 0.

Answer: B
Diff: 2
Section: 17.2

24) Refer to Scenario 17.1. The lowest level of y^* that can be set and still have only the high–productivity people meet it is

A) 16. B) 13 1/3. C) 13. D) 8. E) 0.

Answer: D
Diff: 2
Section: 17.2

25) Refer to Scenario 17.1. If the threshold educational level y^* is set at 10,

A) only individuals in Group A will attain it.
B) only individuals in Group B will attain it.
C) individuals in both groups will attain it.
D) no individuals will attain it.
E) some fraction of individuals in each group will attain it.

Answer: A
Diff: 2
Section: 17.2

26) Refer to Scenario 17.1. If the threshold educational level y^* is set at 7,

A) only individuals in Group A will attain it.
B) only individuals in Group B will attain it.
C) individuals in both groups will attain it.
D) no individuals will attain it.
E) some fraction of individuals in each group will attain it.

Answer: C
Diff: 2
Section: 17.2

27) Refer to Scenario 17.1. If the threshold educational level y^* is set at 14,
A) only individuals in Group A will attain it.
B) only individuals in Group B will attain it.
C) individuals in both groups will attain it.
D) no individuals will attain it.
E) some fraction of individuals in each group will attain it.

Answer: D
Diff: 2
Section: 17.2

28) Refer to Scenario 17.1. An employer who only wants to hire individuals who find learning less costly can do so by choosing y^* to be anywhere between
A) 7 and 14.
B) 8 and 13 1/3.
C) 10 and 16.
D) 13 1/3 and 20.
E) 14 and 20.

Answer: B
Diff: 2
Section: 17.2

Scenario 17.2
Consider the information below:
For Group K the cost of attaining an educational level y is

$$C_K(y) = \$2{,}000y$$

and for Group M the cost of attaining that level is

$$C_M(y) = \$4{,}000y.$$

Employees will be offered \$30,000 if they have $y < y^*$, where y^* is an education threshold determined by the employer. They will be offered \$90,000 if they have $y > y^*$.

29) Refer to Scenario 17.2. The highest level of y^* that can be set and still have the high–productivity people choose to meet it is
A) 90. B) 60. C) 30. D) 22.5. E) 15.

Answer: C
Diff: 2
Section: 17.2

30) Refer to Scenario 17.2. The lowest level of y^* that can be set and still have only the high–productivity people meet it is
A) 90. B) 60. C) 30. D) 22.5. E) 15.

Answer: E
Diff: 2
Section: 17.2

31) Refer to Scenario 17.2. If the threshold educational level y^* is set at 45,
A) only individuals in Group K will attain it.
B) only individuals in Group M will attain it.
C) individuals in both groups will attain it.
D) no individuals will attain it.
E) some fraction of individuals in each group will attain it.

Answer: D
Diff: 2
Section: 17.2

32) Refer to Scenario 17.2. If the threshold educational level y^* is set at 13 1/3,
A) only individuals in Group K will attain it.
B) only individuals in Group M will attain it.
C) individuals in both groups will attain it.
D) no individuals will attain it.
E) some fraction of individuals in each group will attain it.

Answer: C
Diff: 2
Section: 17.2

33) Refer to Scenario 17.2. If the threshold educational level y^* is set at 20,
A) only individuals in Group K will attain it.
B) only individuals in Group M will attain it.
C) individuals in both groups will attain it.
D) no individuals will attain it.
E) some fraction of individuals in each group will attain it.

Answer: A
Diff: 2
Section: 17.2

34) Refer to Scenario 17.2. An employer who only wants to hire those people who find learning less costly can do so by choosing y^* to be anywhere between
A) 15 and 45.
B) 15 and 30.
C) 13 1/3 and 30.
D) 8 and 20.
E) none of the above

Answer: B
Diff: 2
Section: 17.2

35) Because the presence of a warranty for a good is a signal that the good is of high quality,
A) consumers are willing and able to pay more for a good that carries a warranty.
B) consumers are willing to buy goods if and only if the goods come with warranties.
C) producers do not need to charge extra for warranties.
D) producers can use warranties to sort out high–risk customers.
E) producers must make warranties available on all goods.

Answer: A
Diff: 1
Section: 17.2

36) Which of the following is TRUE about producers' willingness to offer warranties on products?
A) Producers are equally likely to offer warranties on high–quality and low–quality goods.
B) Producers are more likely to offer warranties on low–quality goods, because without the signal that the warranty provides, the low–quality good wouldn't sell.
C) Producers are more likely to offer warranties on high–quality goods, because the expected cost of repairs is lower for those goods.
D) Producers have an incentive to deal with third–party companies to provide the warranties, so that an "impartial" view of the product is given to the consumer.
E) Producers will not offer warranties in any market that suffers from asymmetric information.

Answer: C
Diff: 2
Section: 17.2

37) A bumper–to–bumper warranty on a used car is a signaling device that
A) identifies a high–quality car as a high–quality car, because putting such a warranty on a low–quality car would be prohibitively costly.
B) disguises a low–quality car as a high–quality car, and thus makes it easier to sell.
C) is necessary in order to sell a low–quality car at all. Without it no one would risk buying the car.
D) isn't necessary if there is a mix of high–quality and low–quality cars in the market.
E) helps sellers determine whether the buyer is truly looking for a high–quality car.

Answer: A
Diff: 2
Section: 17.2

38) A warranty is most valuable as a signaling device when
A) the buyer has much more information about the product than the seller does.
B) the seller has much more information about the product than the buyer does.
C) the buyer has much more information about his or her own preferences than the seller does.
D) neither the buyer nor the seller has good information about the product.
E) neither the buyer nor the seller has good information about consumer preferences.

Answer: B
Diff: 1
Section: 17.2

39) Which of the following is TRUE about a college education as a signaling device?
A) It is a useful signal only if individuals choose majors related to their ultimate field of employment.
B) It is a useful signal only if a college education is open to all individuals, no matter what their previous level of educational accomplishment was.
C) It is a useful signal whether or not people actually learn anything in college.
D) It is a useful signal only if the job in question cannot be done without the preparatory coursework the college degree required.
E) It is less and less a useful signal in the post–industrial economy, where the skill sets employers need change so rapidly.

Answer: C
Diff: 2
Section: 17.2

40) Which of the following job market signals are less costly for high–quality workers to send than low–quality workers?
A) Spending long hours at the office
B) Sending emails to coworkers and supervisors at night and on weekends
C) Leaving voice–mail message for colleagues before or after regular business hours
D) all of the above

Answer: A
Diff: 1
Section: 17.2

41) The process by which sellers send signals to buyers conveying information about product quality is known as:
A) asymmetric information.
B) market signaling.
C) a lemons problem.
D) moral hazard.

Answer: B
Diff: 1
Section: 17.2

42) Job market signals like dressing well for interviews are not especially effective because:
A) the cost of dressing well is about the same for high–quality and low–quality workers.
B) many businesses have adopted casual office attire, so dressing well is not important to the firm.
C) federal labor laws prohibit firms from using dress or appearance as an employment criterion.
D) none of the above

Answer: A
Diff: 1
Section: 17.2

43) In the insurance market, "moral hazard" refers to the problem that
A) insurers can't tell high–risk customers from low–risk customers.
B) high–risk customers have an incentive to give false signals to make themselves look like low–risk customers.
C) companies may unfairly lump individuals together by race, sex, age or other characteristics in an attempt to use demographic data to pinpoint high–risk populations.
D) individuals are willing and able to pay different amounts for insurance, but must all be charged the same amount.
E) individuals may change their behavior after the insurance is bought, so that they behave in a more high–risk manner than they did before.

Answer: E
Diff: 1
Section: 17.3

44) Which of the following would be LEAST likely to contribute to a moral hazard problem among drivers?
A) Provide medical coverage to all drivers, their passengers, and any and all individuals involved in the accident, no matter who was at fault.
B) Provide medical coverage and car repair/replacement coverage to drivers, their passengers, and any and all individuals involved in the accident, no matter who was at fault.
C) Modify all cars to remove the driver's seat belt and the steering wheel air bag.
D) Pass a law limiting the amount of damages that juries may award in accident cases.
E) Make automobile insurance mandatory for all drivers.

Answer: C
Diff: 2
Section: 17.3

45) When a moral hazard problem exists for automobile driving, the marginal cost of driving
A) is lowered, and the amount of driving done is raised above the efficient level.
B) is lowered, and the amount of driving done is lowered below the efficient level.
C) is raised, and the amount of driving done is raised above the efficient level.
D) is raised, and the amount of driving done is lowered below the efficient level.
E) is raised above the efficient level, but market forces keep the total amount of driving is kept at the efficient level.

Answer: A
Diff: 2
Section: 17.3

46) If the moral hazard problem in automobile driving were to be eliminated, the marginal cost of driving would be
A) lowered enough to pull the amount of driving back down to the efficient level.
B) lowered enough to raise the amount of driving back up to the efficient level.
C) raised enough to pull the amount of driving back down to the efficient level.
D) raised enough to raise the amount of driving back up to the efficient level.
E) lowered back down to the efficient level, relieving the stress on market forces.

Answer: C
Diff: 2
Section: 17.3

Scenario 17.3
Consider the following information:
The probability of a fire in a factory without a fire prevention program is 0.01. The probability of a fire in a factory with a fire protection program is 0.001. If a fire occurred, the value of the loss would be $300,000. A fire prevention program would cost $80 to run.

47) Refer to Scenario 17.3. If there is no insurance and a fire protection program in place, the expected loss from fire for this company is
A) $0. B) $300. C) $3,000. D) $6,000. E) $300,000.

Answer: B
Diff: 1
Section: 17.3

48) Refer to Scenario 17.3. If there is no insurance and no fire protection program in place, the expected loss from fire for this company is

A) $0. B) $300. C) $3,000. D) $6,000. E) $300,000.

Answer: C
Diff: 1
Section: 17.3

49) Refer to Scenario 17.3. If the fire protection program were in place, the company could insure the warehouse for a premium equal to

A) the loss from the fire, $300,000.
B) the expected loss from the fire, $300.
C) the expected loss from the fire, $3,000.
D) the cost of the fire protection program, $80.
E) $0.

Answer: B
Diff: 2
Section: 17.3

50) Refer to Scenario 17.3. If the fire protection program were not in place, the insurer would not be willing to ensure the warehouse for any amount less than

A) $80. B) $300. C) $3,000. D) $6,000. E) $300,000.

Answer: C
Diff: 2
Section: 17.3

51) Refer to Scenario 17.3. Moral hazard arises in this situation because once the firm

A) pays the premium that is based on the 0.001 probability, it has no incentive to spend the additional $80 for the fire protection program, so the true probability of loss is no longer 0.001.
B) pays the premium that is based on the 0.01 probability, it has no incentive to spend the additional $80 for the fire protection program, so the true probability of loss is no longer 0.01.
C) puts the fire protection program in place, it has less incentive to spend $300 for a premium, leaving the firm underinsured.
D) puts the fire protection program in place, it has less incentive to spend $6,000 for a premium, leaving the firm underinsured.
E) puts the fire protection program in place, it will consider that a substitute for insurance and not be able to deal with the loss from a fire should it occur.

Answer: A
Diff: 2
Section: 17.3

52) Refer to Scenario 17.3. Moral hazard would be eliminated in this situation if
A) the insurer would always charge $300.
B) the insurer would always charge $6000.
C) the insurer could costlessly monitor whether a fire prevention program has been implemented, and adjust the premium upward if it is not.
D) the insurer could costlessly monitor whether a fire prevention program has been implemented, and adjust the premium downward if it is not.
E) the fire did not occur.

Answer: C
Diff: 2
Section: 17.3

Scenario 17.4
Consider the following information:
StowUrStuff Storage is located slightly below sea level in a coastal town. It could build and maintain a flood control system around its property at an annual cost of $1000, and if it did so, the probability of a flood's doing $1,000,000 in damage during the year would be .005. With no flood control system, the probability of such a flood would be .01.

53) Refer to Scenario 17.4. If there is no flood insurance and the flood control system is in place, the expected loss from a flood is
A) $5,000.
B) $10,000.
C) $100,000.
D) $200,000.
E) $1,000,000.

Answer: A
Diff: 1
Section: 17.3

54) Refer to Scenario 17.4. If there is no flood insurance and no flood control system is in place, the expected loss from a flood is
A) $5,000.
B) $10,000.
C) $100,000.
D) $200,000.
E) $1,000,000.

Answer: B
Diff: 1
Section: 17.3

55) Refer to Scenario 17.4. If the flood control system were in place, the firm could insure against a flood for an annual premium of
A) $5,000.
B) $10,000.
C) $100,000.
D) $200,000.
E) $1,000,000.

Answer: A
Diff: 2
Section: 17.3

56) Refer to Scenario 17.4. If the flood control system were not in place, the insurer would not be willing to insure against the flood for any premium less than
A) $5,000.
B) $10,000.
C) $100,000.
D) $200,000.
E) $1,000,000.

Answer: B
Diff: 2
Section: 17.3

57) Refer to Scenario 17.4. Moral hazard arises in this situation because once the firm
A) pays the premium that is based on the .005 probability, it has no incentive to spend the additional $1000 for the flood control system, so the true probability of loss is no longer .005.
B) pays the premium that is based on the .01 probability, it has no incentive to spend the additional $1000 for the flood control system, so the true probability of loss is no longer .01.
C) provides for flood control, it has less incentive to spend $5000 on premiums, leaving itself underinsured.
D) provides for flood control, it has less incentive to spend $10,000 on premiums, leaving itself underinsured.
E) provides for flood control, it will consider that a substitute for insurance and not be able to deal with the loss from a flood should it occur.

Answer: A
Diff: 2
Section: 17.3

58) Refer to Scenario 17.4. Moral hazard would be eliminated in this situation if
A) the insurer would always charge $5000.
B) the insurer would always charge $10,000.
C) the insurer could costlessly monitor whether a flood control system is in place, and adjust the premium upward if it is not.
D) the insurer could costlessly monitor whether a flood control system is in place, and adjust the premium downward if it is not.
E) the flood did not occur.

Answer: C
Diff: 2
Section: 17.3

59) The presence of deposit insurance in the savings and loan industry
A) created an adverse selection problem because good S&Ls were forced out of the market.
B) solved its own adverse selection problem because it pushed badly managed S&Ls out of the market.
C) contributed to "depositor moral hazard" but did not involve a moral hazard problem with owners.
D) contributed to "moral hazard by owners" but did not involve a moral hazard problem with depositors.
E) contributed to both "depositor moral hazard" and "moral hazard by owners."

Answer: E
Diff: 1
Section: 17.3

60) Over the past several years, the federal government has rescued a few financially distressed banks and other large private companies, and the key reasons for these actions is to stabilize financial markets and to prevent additional business failures that may arise from the original problem. However, critics of these interventions argue that these actions generate a moral hazard problem. Why?
A) Government oversight of rescued firms is typically based on limited information, so the outcome is economically inefficient.
B) Rescued firms will have a difficult time buying insurance in private markets, so the government will also have to insure the firm against losses from fire, theft, etc.
C) Managers have more information about the financial strength of their firm than government officials, so the rescue attempts may be unnecessary.
D) Managers may be more likely to invest in risky projects if they believe the government will save the firm in case of failure.

Answer: D
Diff: 1
Section: 17.3

61) Traditionally, the federal government provides disaster relief funds to flood victims so that they can rebuild their homes after a major flood. However, the government has recently denied requests to rebuild some homes that were situated in flood-prone areas. This action represents an attempt to _____ the moral hazard problem associated with building private homes in risky areas.
A) enhance B) mitigate C) legalize D) support

Answer: B
Diff: 1
Section: 17.3

62) In insurance markets, moral hazard creates economic inefficiency because:
A) insurance companies are price setters rather than price takers.
B) insurance products are not homogenous goods.
C) there are many buyers but only a few sellers.
D) insured individuals do not correctly perceive the costs or benefits of their actions.

Answer: D
Diff: 1
Section: 17.3

63) The principal–agent problem in corporations exists because the managers of a firm
A) may pursue their own goals even when the result is lower profit for owners.
B) may know how to operate the business better than absentee owners do, and yet not be allowed to.
C) are generally unable to do the monitoring that would result in the firm's avoiding moral hazard problems.
D) are generally unable to do the monitoring that would result in the firm's avoiding adverse selection.
E) are generally unable to monitor workers, who do not care about the profits due the managers.

Answer: A
Diff: 1
Section: 17.4

64) Managers' pursuit of which of the following objectives would NOT lead to a principal–agent problem in a corporation?
A) The corporation's growth
B) Increased market share for the corporation
C) The maximum possible profit for the corporation
D) A great "golden parachute" or retirement package
E) Increased current salary and fringe benefits

Answer: C
Diff: 1
Section: 17.4

65) The principal–agent problem of ownership vs. control of the corporation arises when owners and managers
A) are the same people.
B) pursue objectives that differ from those their customers wish them to pursue.
C) pursue objectives that differ from those their workers wish them to pursue.
D) pursue objectives that differ from those the government wishes them to pursue.
E) pursue different objectives.

Answer: E
Diff: 1
Section: 17.4

66) The principal–agent problem of ownership vs. control of the corporation tends to get worse when
A) stock in a corporation is held exclusively by a small number of people who control the company's day–to–day operations.
B) stock in the company is tightly held, but there are some "outsider" stockholders.
C) stock in the company is very diffusely held, with no individual or group having control over a large block of stock.
D) managers have profit–sharing schemes as part of their incentive package.
E) managers focus on maximizing the firm's profits, rather than the firm's market share.

Answer: C
Diff: 2
Section: 17.4

Scenario 17.5

Consider the following information:
Income to the firm from workers who sell door–to–door

	Poor Luck	Good Luck
Low Effort (e = 0)	$5,000	$7,000
High Effort (e = 1)	$7,000	$13,000

Cost of effort: c = $5000e
Probabilities: Bad luck = .75; Good luck = .25

67) A principal–agent problem arises in the situation in Scenario 17.5 because
A) the principal can measure effort and output; the agent can measure only output.
B) the principal can measure only effort, and the agent can measure only output.
C) the principal can measure only output, and the agent can measure effort and output.
D) neither the principal nor the agent can measure effort.
E) neither the principal nor the agent can measure output.

Answer: C
Diff: 1
Section: 17.4

68) Refer to Scenario 17.5. If low effort is exerted, expected income is
A) $5000. B) $5500. C) $6000. D) $6500. E) $7000.

Answer: B
Diff: 2
Section: 17.4

69) Refer to Scenario 17.5. If a fixed wage of $3000 is given the individual worker, the result will be
A) low effort 75% of the time.
B) low effort 25% of the time.
C) low effort.
D) high effort.
E) high or low effort depending on whether the worker thinks the $3000 is an acceptable wage.

Answer: C
Diff: 2
Section: 17.4

70) Refer to Scenario 17.5. The owners can't know whether the workers are exerting high or low effort if income is
A) $5000.
B) $7000.
C) above $7000.
D) $13,000.
E) above $13,000.

Answer: B
Diff: 2
Section: 17.4

71) Refer to Scenario 17.5. Under which of the following payment schemes would workers have an incentive to exert high effort?
A) A guaranteed wage equal to $0
B) A guaranteed wage equal to $5000
C) A guaranteed wage equal to $10,000
D) A wage equal to the income earned, minus $4000
E) A wage equal to the income earned, minus $1000

Answer: E
Diff: 2
Section: 17.4

72) In the economic literature on principal–agent problems, the _____ is the person who takes some action, and the _____ is the person whom the action affects.
A) agent, principal
B) principal, agent
C) Both statements describe the agent.
D) Both statements describe the principal.

Answer: A
Diff: 1
Section: 17.4

73) Suppose Bob owns two factories that are located several hundred miles apart. Bob decides to manage one of the plants himself, and he hires another person to manage the second plant. For purposes of operating the second plant, who is the agent and who is principal?
A) Bob is the agent and the manager is the principal.
B) Bob is the principal and the manager is Bob's agent.
C) Both Bob and the manager are principals.
D) We need more information to determine the identities of the principal and the agent in this case.

Answer: B
Diff: 1
Section: 17.4

74) Use the following statements to answer this question:
I. Based on the principal–agent framework in economics, we know that the lack of incentive compatibility may arise in private firms but not in public agencies or government bureaus.
II. The key problem in principal–agent situations is the principal's fundamental inability to oversee or supervise the agent.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: C
Diff: 1
Section: 17.4

75) Asymmetric information problems arise
A) in horizontally integrated firms, but not vertically integrated firms.
B) in vertically integrated firms, but not horizontally integrated firms.
C) in both vertically and horizontally integrated firms.
D) only in firms that do not have the advantage of either horizontal or vertical integration.
E) only when a single firm is both horizontally and vertically integrated.

Answer: C
Diff: 1
Section: 17.5

76) What is the problem with paying plant managers in multi–plant firms according to the level of output they produce?
A) Managers in low–cost or high–capacity plants could be penalized, in percentage terms, for their overproduction.
B) The production problem in multi–plant firms is usually how to lower production to increase market power, not how to increase production.
C) Managers in high–cost or low–capacity plants could be penalized for production constraints over which they have no control.
D) Managers would have an incentive to understate the productive capacity of their plants.
E) Managers would have an incentive to overstate the productive capacity of their plants.

Answer: C
Diff: 2
Section: 17.5

77) What is the problem with paying plant managers in multi–plant firms according to how much each plant produces relative to its capacity?
A) Managers in low–cost or high–capacity plants could be penalized, in percentage terms, for their overproduction.
B) The production problem in multi–plant firms is usually how to lower production to increase market power, not how to increase production.
C) Managers in high–cost or low–capacity plants could be penalized for production constraints over which they have no control.
D) Managers would have an incentive to understate the productive capacity of their plants.
E) Managers would have an incentive to overstate the productive capacity of their plants.

Answer: D
Diff: 2
Section: 17.5

78) The problem of asymmetric information in multi–plant firms involves
A) only the problem of how to get managers to produce as much as possible.
B) only the problem of how to get managers to produce the amount the larger firm wants them to, whether it be a lot or a little.
C) both the problem of how to get managers to produce the appropriate amount and the problem of how to get them to accurately report their capacity.
D) both the problem of how to get managers to produce the appropriate amount and the problem of how to get them to not sell that output outside of the firm.
E) both the problems of vertical and horizontal integration with the rest of the firm.

Answer: C
Diff: 2
Section: 17.5

79) The problem of production in multi–plant firms with asymmetric information can be solved by paying the manager
A) a piece rate, some constant amount per unit of output produced.
B) a larger amount for each unit than was paid for the previous unit, to reflect increasing marginal cost.
C) a smaller amount for each unit than was paid for the previous unit, to reflect decreasing marginal revenue.
D) an annual bonus that increases with each unit of output up to capacity, and decreases with each unit of output past capacity.
E) an annual bonus that is calculated decreases with each unit of output up to capacity, and increases with each unit of output past capacity.

Answer: D
Diff: 2
Section: 17.5

80) The bonus of a plant manager in a vertically integrated firm is based on the following formula:

$$\text{Bonus} = 10{,}000 - 0.5(Qf - Q)$$

where Qf is feasible production and Q is actual production. The value for Qf is provided by the plant manager at the beginning of the year. With this scheme, the plant manager has an incentive:
A) to underestimate Qf.
B) to overestimate Qf.
C) to reveal the true Qf and make Q as small as possible.
D) to reveal the true Qf and make Q as large as possible.

Answer: A
Diff: 2
Section: 17.5

81) Which incentive scheme would simultaneously elicit accurate information about feasible plant production levels and motivate managers to perform up to potential (in the following schemes, B is the bonus payment, Q is actual plant output, and Q_f is the manager's estimate of feasible output)?
A) $B = 0.4Q$
B) $B = 0.4(Q - Q_f)$
C) $B = 0.4Q_f + 0.3(Q - Q_f)$ if $Q > Q_f$
D) $B = 0.4Q_f - 0.6(Q - Q_f)$ if $Q < Q_f$
E) $B = 0.4Q_f - 0.6(Q - Q_f)$ if $Q > Q_f$

Answer: C
Diff: 3
Section: 17.5

82) Firms that have several plants that produce the same or related products are said to be:
A) horizontally integrated.
B) vertically integrated.
C) conglomerates.
D) cooperatives.

Answer: A
Diff: 1
Section: 17.5

83) If all of the divisions in a vertically integrated firm are owned by the same company, why is it possible that asymmetric information problems can lead to inefficient outcomes in vertically integrated firms?
A) Divisions that produce parts for other divisions have effective monopoly power, so the outcome for these division must be inefficient.
B) This outcome is no longer possible in the U.S. after passage of the Sarbanes–Oxley law.
C) Vertically integrated firms are often subject to antitrust investigations, so managers routinely limit the amount of information that flows between divisions.
D) Managers in some divisions may not have information about production capacities or costs in related divisions.

Answer: D
Diff: 1
Section: 17.5

84) Firms that contain some divisions that produce parts and components to be used by other divisions in order to generate finished goods are said to be:
A) horizontally integrated.
B) vertically integrated.
C) multinationals.
D) corporations.

Answer: B
Diff: 1
Section: 17.5

85) The "efficiency wage" is the wage at which
A) employees have no incentive to shirk.
B) employees have an incentive to do the optimal (positive) amount of shirking.
C) the cost of looking for work is equal to the value of the leisure time for the unemployed individual.
D) there is no unemployment.
E) there is only frictional unemployment.

Answer: A
Diff: 1
Section: 17.6

86) If individuals are paid the wage at which the supply of labor is equal to the demand for labor,
A) no unemployment exists, and workers have no incentive to shirk.
B) no unemployment exists, and workers have an incentive to shirk.
C) some unemployment still exists, but workers have no incentive to shirk.
D) some unemployment still exists, but managers can tell whether or not workers are shirking.

Answer: B
Diff: 1
Section: 17.6

87) The efficiency wage is
A) lower than the market–clearing wage, to penalize shirking.
B) higher than the market–clearing wage, to penalize shirking.
C) lower than the market–clearing wage, to allow managers the resources to monitor shirking.
D) higher than the market–clearing wage, to reward workers for informing on others who shirk.
E) lower than the market–clearing wage, because of shirking done by managers.

Answer: B
Diff: 2
Section: 17.6

88) The efficiency wage is
A) a wage at which there is no unemployment, and shirking workers are not counted in the pool of total labor.
B) a wage at which there is a positive amount of unemployment. Individuals who are fired for shirking will be penalized with a period of unemployment.
C) a wage at which there is a shortage of labor. Firms who fire a worker for shirking will be able to hire another one easily.
D) the wage that is paid to high–quality, non–shirking workers. Other workers are paid the market–clearing wage.
E) the wage that subtracts the cost of shirking from the market–clearing wage to determine that which is really paid.

Answer: B
Diff: 2
Section: 17.6

89) The "no shirking constraint" (NSC) curve never crosses the supply of labor curve, so
A) the market never reaches equilibrium.
B) there is always full employment in equilibrium.
C) there is always some unemployment in equilibrium.
D) the efficiency wage is always lower than the market–clearing wage.
E) the gap between the NSC curve and the supply of labor curve equals the difference between the efficiency wage and the market–clearing wage.

Answer: C
Diff: 2
Section: 17.6

90) The "no shirking constraint" (NSC) curve is
A) downward–sloping to reflect the fact that at higher wages, firms will monitor workers more to see whether they are shirking.
B) downward–sloping to reflect the fact that shirking tends to be higher in lower–paying industries.
C) upward–sloping because at high levels of unemployment, workers will refrain from slacking without much other incentive.
D) upward–sloping because at high levels of employment, many "slacking" individuals have been hired.
E) vertical because the constraint represents the absolute amount of time a firm will tolerate workers' slacking without laying them off.

Answer: C
Diff: 2
Section: 17.6

91) Suppose new electronic devices make it easier to monitor the effort levels of workers. What happens to the NSC curve in the efficiency wage model?
A) Shifts upward
B) Shifts downward
C) Remains the same
D) The NSC curve remains the same, and the labor supply curve shifts leftward because shirking workers will leave the labor force.

Answer: B
Diff: 1
Section: 17.6

92) Suppose new electronic devices make it easier to monitor the effort levels of workers. If some shirking is still possible in the efficiency wage model, what happens to the efficiency wage?
A) Declines, but remains above the competitive wage
B) Declines, and falls below the competitive wage
C) Increases
D) Does not change

Answer: A
Diff: 2
Section: 17.6

93) Suppose new electronic devices make it easier to monitor the effort levels of workers. If some shirking is still possible in the efficiency wage model, what happens to the level of unemployment?
A) Increases, but some unemployment remains
B) Increases, and the labor market reaches full employment
C) Decreases
D) Does not change

Answer: A
Diff: 2
Section: 17.6

94) Use the following statements to answer this question:
I. Efficiency wage theory was developed to help explain persistent unemployment and wage discrimination in labor markets.
II. Efficiency wage theory recognizes that labor productivity may be affected by the wage rate.

A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II are false.

Answer: A
Diff: 1
Section: 17.6

95) Ford Motor Company was one of the first major companies to adopt a wage structure that is comparable to efficiency wages. What was the outcome of Ford's experiment with efficiency wages?

A) Lower labor force turnover
B) Higher labor productivity
C) Less absenteeism
D) all of the above

Answer: D
Diff: 1
Section: 17.6

96) As part of the most recent collective bargaining agreement with state employees, a state government must offer dental insurance at "reasonable, nonprofit rates." The state plans to self insure in place of using a private insurance company. Statistical evidence suggests that the average household currently spends $300 per year for corrective dental work and $80 for routine checkups. Administrative costs are expected to average $20 per family. The collective bargaining agreement dictates that the plan's coverages and rates be fixed for a period of three years. The auditor considers the choice of the plan to be extremely important. Consequently, the auditor has asked you to evaluate the three proposals listed below in terms of their propensity to result in adverse selection and/or moral hazard. Proposal 1 would charge a $400 premium with no deductible. Coverage is extended to preexisting conditions, but to cover the nondeductible clause, routine checkups are not covered. Proposal 2 charges a $200 premium with a $200 deductible. The plan does not cover preexisting conditions, but does cover routine office visits. Proposal 3 charges a $150 premium with a $150 deductible. This plan doesn't cover preexisting conditions or routine checkups. The collective bargaining agreement dictates that participation in the plan must be at the employee's option.

Answer: Plan 1 creates adverse selection difficulties because of the pre-existing condition coverage. Employees with existing dental problems would choose the plan in disproportionate numbers. The plan also creates a moral hazard because participants have little incentive to maintain their check schedules. Check-ups are not covered whereas dental problems are fully covered.

Plan 2 reduces adverse selection problems by excluding pre-existing conditions. Although adverse selection would still be present, it is not as significant as if preexisting conditions are covered. Coverage of the routine check-up should reduce or eliminate moral hazard difficulties. (This is the best plan.)

Plan 3 minimizes adverse selection by excluding preexisting conditions for the reasons discussed with Plan 2. The exclusion of coverage for the routine check-up should make moral hazard problems worse.

Diff: 2
Section: 17.1

97) The market for used cars in a particular region includes both high quality and low quality cars. High quality cars are sold primarily to quality sensitive customers, while low quality cars are sold to price sensitive buyers. The submarkets for high quality and low quality cars can be described by the supply and demand curves:

$Q_D^H = 160{,}000\ \ 12.5P^H$

$Q_S^H = -48{,}000 + 13.5P^H$

$Q_D^L = 110{,}000 - 12.5P^L$

$Q_S^L = 20{,}000 + 10P^L$,

where Q_D^H, Q_S^H refer to the quantities demanded and supplied of high quality cars, Q_D^L, Q_S^L refer to the quantities demanded and supplied of low quality cars, P^H and P^L refer to the prices of high quality and low quality cars. All quantities are measured in cars per month, prices are measured in dollars.

a. Assuming that buyers and sellers are both able to distinguish low quality and high quality cars, determine the price and quantity that will prevail in each submarket.
b. Examine the case where sellers are able to accurately determine used car quality but buyers are not. You may assume that buyers assume that all cars are of average quality so that an average demand curve is appropriate. Determine the price and quantity in each submarket.
c. Using diagrams, analyze the additional developments in the market until final long run equilibrium is reached. You must describe the eventual outcome, but no calculations are required for this part of the problem.

Answer: ***a.***

If we assume perfect information by buyers and sellers, buyers correctly appraise quality. Supply and demand are equated in each submarket

$Q_D^H = Q_S^H$ and $Q_D^L = Q_S^L$

Equating Q_D^H and Q_S^H

$160{,}000 - 12.5P^H = -48{,}000 + 13.5P^H$

$208{,}000 = 26P^H$

$P^H = 8{,}000$

$Q^H = 160{,}000 - 12.5(8{,}000)$

$Q^H = 60{,}000$

Equating Q_D^L and Q_S^L

$110{,}000 - 12.5P^L = 20{,}000 + 10P^L$

$90{,}000 = 22.5P^L$

$P^L = 4{,}000$

$Q^L = 110{,}000 - 12.5(4{,}000)$

$Q^L = 60{,}000$

With perfect information there would be equal numbers of high and low quality cars (60,000 each). High quality cars would sell for $8,000, low quality for $4,000.

b.

With imperfect information, buyers treat all cars as average. Let Q_D^A represent average demand

$Q_D^A = (Q_D^H + Q_D^L) / 2$

$Q_D^A = [(160{,}000 - 12.5P) + (110{,}000 - 12.5P)]/2$

$Q_D^A = 135{,}000 - 12.5P$

Equate Q_D^A to Q_S^L and Q_S^H to determine prices and quantities in submarkets

Equating Q_D^A to Q_S^H

$135{,}000 - 12.5P^H = -48{,}000 + 13.5P^H$

$183{,}000 = 26P^H$

$P^H = 7{,}038.46$

$Q^H = -48{,}000 + 13.5(7{,}038.46)$

$Q^H = 47{,}019$

Equating Q_D^A to Q_S^L

$135{,}000 - 12.5P^L = 20{,}000 + 10P^L$

$115{,}000 = 22.5P^L$

$P^L = 5{,}111.11$

$Q^L = 20{,}000 + 10(5{,}111.11) = 71{,}111$

The number of high quality cars and their price decreases, and the number of low quality cars and their price increases.

c.

In part (b), buyers initially believed that there were equal numbers of high and low quality cars. However, low quality cars are more numerous. Buyers began to adjust their expectations of quality to something less than average. This shifts high quality supply further to the left. Furthermore it would shift demand towards the low quality demand curve as buyers assume that a car will be of low quality. Shifts continue until only low quality cars are available.

Diff: 2
Section: 17.1

98) Explain the nature and consequences of asymmetric information for each of the following cases. What options are available in each instance to reduce the problem?
a. medical insurance
b. issuance of credit cards
c. professional athletes
d. market for used appliances

Answer: ***a.***

Medical insurance is susceptible to adverse selection, since unhealthy people are more likely to want insurance than healthy individuals. A premium based on the incidence of claims among the general population will be too low. Remedies include medical examinations, medical histories, and refusal to cover pre–existing conditions.

b.

The credit problem arises when all customers must be charged the same rate. Poor credit risks find the rate attractive and apply for credit in disproportionate numbers. The interest rate based on average bad loan rates will be too low. To protect from this bias, credit companies can share credit histories.

c.

Professional athletes become a problem when free agency is allowed. The athlete's existing team has more information regarding the players' health than a new team. The expectation is that free agent players have higher disability rates than renewed players. To protect against this problem, professional franchises should require medical examinations and insist on clauses that void the contract if medical conditions are concealed.

d.

Markets for used appliances can be segmented according to quality. Buyers have an incentive to regard all appliances as being low quality. This depresses the price and reduces the availability of high appliances relative to the number that would exist with better information. The main solution is for sellers of high quality articles to provide warranties.

Diff: 2
Section: 17.1

99) In this problem, a labor market exists where employers hire and pay workers according to how much formal education workers possess. Education is a proxy for the level of productivity that employers can expect from workers. Therefore, employers follow a strategy in which they hire workers and pay salaries according to the following conditions:

Degrees Above the High School Level	Values of Post High School Education During Working Life, B(y)
None (y = 0 years)	0
Associate's Degree (y = 2 years)	$30,000
Bachelor's Degree (y = 4 years)	$51,000
Master's Degree (y = 6 years)	$58,000

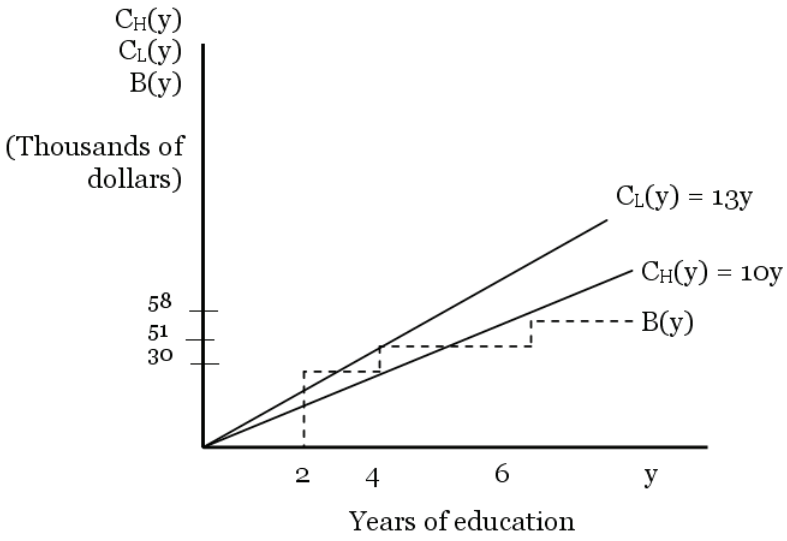
Assume that there are only two types of worker abilities, those who are less productive (type L) and those who are highly productive (type H). The less productive workers have to study harder than highly productive workers in order to earn any degree. Consequently, the costs (including the psychic costs of study effort) of attaining various levels of education for these two types of employees are different.

For less productive workers: $C_L(y) = \$13{,}000y$
For highly productive workers: $C_H(y) = \$10{,}000y$

a. Draw a diagram with years of education on the horizontal axis. Graph the benefits to education B(y) and the costs of education for each of the two types of workers. Discuss what level of education each type of worker should obtain.
b. Now use the equations above to verify your answer from part (a) mathematically.
c. Explain the value of formal education above the high school level in the market place to employers.

Answer: ***a.***

As shown in this figure, the benefits to education B(y) is a step function which increases in value at those values of y corresponding to each degree attained. The cost of education for each type of worker is a constant upward sloping line, and the steeper line is for the low productivity workers. As you can see, the net benefits of education B(y) – C(y) is greatest when the low type earns just an associate's degree and when the high type earns a bachelor's degree. Neither type should earn the master's degree.



b.

Workers should strive for the level of formal education that maximizes the net benefits, that is B(y) – C(y). First let us consider the low type, L:

Should the associate's degree (y = 2) be obtained?:
$13y = C_L(y) < B(y) = 30$
$y < 30/13 = 2.3$
Yes, the associate's degree should be obtained since $2 < 2.3$.

Should the bachelor's degree (y = 4) be obtained?:
$13y < 51$
$y < 51/13$
$y < 3.9$
No, the bachelor's degree should not be obtained since 4 is not less than 3.9.

Should the master's degree (y = 6) be obtained?:
$13y < 58$
$y < 58/13$
$y < 4.46$
No, the master's degree should not be obtained since 6 is not less than 4.46.

Now perform the same calculations for the high type of worker, H:

Associate's degree (y =2)?:
$10y < 30$
$y < 3$
Yes, the high type should obtain (at least) an associate's degree, since the net benefit is 30 – 20 = 10.

Bachelor's degree (y = 4)?:
$10y < 51$
$y < 5.1$
Yes, the bachelor's degree should be obtained since $4 < 5.1$ The net benefit is 51 – 40 = 11, so this choice is better than stopping with the associate's degree.

Master's degree (y = 6)?:
$10y < 58$
$y < 5.8$
No, the master's degree should not be obtained since 6 is not less than 5.8.

c.
The formal education (earned degrees) above high school serves as a signal to employers as to the expected level of productivity of potential employees. Low levels of formal education indicate expected low productivity, and high levels of formal education indicate expected high productivity from the employee.

Diff: 2
Section: 17.2

100) A certain firm can hire two types of workers: Group A workers who have high productivity and Group B workers with low productivity. Group A workers will add $27,500 to the firm's revenues per year, while Group B workers will increase the firm's revenues by $15,000 per year. The firm's managers expect workers to be employed for eight years. The differences in the workers' productivity levels are reflected in their costs per year of education. Each year of education (which includes the psychic costs of study effort) costs an A worker $12,500, while each year costs a B worker $25,000.

a. Under competitive conditions, how much would A and B workers earn?
b. Assuming that the firm is unable to distinguish A from B workers and that it is equally likely that a worker is of either type, what pay scale will the firm offer?
c. Suppose that the firm decides to use education as a market signaling device to distinguish A workers from B workers. What education requirement could the firm set?

Answer: ***a.***
Under competitive conditions workers will receive their marginal revenue product.
$MRP_A = \$27,500 =$ Wage for A
$MRP_B = \$15,000 =$ Wage for B

b.
The firm would pay all workers an average wage. In this case, the average wage is $21,250. This wage overpays B workers $6,250 and underpays A workers by that amount.

c.
The benefit to education is $12,500 per year for 8 years or $100,000.
B workers will obtain education as long as:
$100,000 < 25,000y^*$
$y^* > 4$
Requirement must be greater than 4 years.
A workers will obtain education as long as:
$100,000 > 12,500y^*$
$y^* < 8$
Requirement must be less than 8 years.

Diff: 2
Section: 17.2

101) Assume that the owners of a firm know that the firm's profits will depend upon two parameters: (1) how hard the managers work, and (2) the state of the economy. For simplicity, assume that the managers can exert either maximum or minimum effort and that the economy can be either favorable or unfavorable. The profits under various situations are represented by the matrix below.

	Favorable Economy	Unfavorable Economy
Maximum Effort	700,000	400,000
Minimum Effort	400,000	200,000

The firm considers there to be an equal probability of either state of the economy. The manager considers the cost of effort to be C = 55,000 x, where x = 1 for maximum effort, 0 for minimum effort. The firm is considering the pay scheme described below. Evaluate each alternative in terms of their incentive effects for the manager and their effect on the firm's profitability.

a. a flat salary of $30,000 that is not tied to the firm's performance
b. a bonus of 0 if profit equals 200,000 or 400,000 and a bonus of 120,000 if profit equals 700,000
c. a bonus determined by the formula: B = 0.20(PROFIT – 300,000)
d. a bonus determined by the formula: B = 0.24(PROFIT – 300,000)

Answer: ***a.***

The flat salary provides no incentive for maximum effort. The expected profit is $300,000 under these circumstances.

b.

The bonus of 0 to $120,000 will be effective. The expected bonus is $60,000 = [0.5(0) + 0.5(120,000)]. The $60,000 exceeds the cost of effort to the manager inducing maximum effort. With maximum effort the firm's net profit will rise either to $400,000 or $700,000 – $120,000 or $580,000.

c.

The scheme will not induce maximum effort. If the manager exerts maximum effort, expected profit is $550,000. With an expected profit of $550,000, the expected bonus is:

$B^E = 0.20(550,000 - 300,000)$

$B^E = 50,000$

The expected bonus is less than the cost associated with maximum effort.

d.

This bonus scheme would be effective in bringing about maximum effort.

$B^E = 0.24(550,000 - 300,000)$

$B^E = 60,000$

The expected bonus exceeds the cost associated with effort.

Diff: 2
Section: 17.4

102) Explain what the principal–agent problem is, and discuss evidence of its existence in the banking industry in the United States.

Answer: The principal–agent problem is an example of asymmetric information in the market place. This problem occurs when one person's welfare (the principal) depends on what another person does (the employee or agent).

The study of the banking industry in Pennsylvania (365 banks) in 1970 showed evidence of the principal–agent problem. It was found that manager–controlled banks spent approximately six percent more for expenses for furniture and equipment and general occupancy than did owner–controlled banks. In two other major categories of expenditures, there were no significant differences in expenditures by the two types of banks.

Diff: 1
Section: 17.4

103) Explain what the principal–agent problem is, and explain evidence of its existence in hospitals in the United States.

Answer: The principal–agent problem is an example of asymmetric information in the market place. This problem occurs when one person's welfare (the principal) depends upon what another person does (the agent).

The study of 725 hospitals from 14 major hospital chains by Herzlinger and Krosker found that the rate of return on investment and the average costs of two types of hospitals did differ. They found that for–profit hospitals earned an 11.6 percent return on investment, and nonprofit hospitals earned 8.8 percent return on investment in 1977. After differences in hospital functions were netted out, using regression analysis, the authors found that the average cost of a patient day in nonprofit hospitals was 8 percent higher than in for–profit hospitals.

Diff: 1
Section: 17.4

104) In a competitive labor market, shirking on the job can be a problem. In this market for labor services, the demand for labor is expressed as:

$$W = \frac{270{,}000{,}000}{L^{1.5}}$$

where W is wage rate (dollars per hour) and L is number employed per unit of time. The no shirking constraint (NSC) is expressed as:

$$NSC = \frac{L^2}{1 \cdot 10^9}$$

where NSC is the minimum wage workers need not to shirk, and L is the number employed per unit of time. Assume that the labor force $L^* = 150{,}000$. Determine the following:

a. the level of unemployment that would result when firms pay the efficiency wage
b. the market clearing wage
c. the efficiency wage

Answer: ***a.***

The level of employment that would occur when the efficiency wage is paid is determined where NSC curve intersects the demand for labor curve.

$$W = NSC$$

$$\frac{270 \cdot 10^6}{L^{1.5}} = \frac{L^2}{1 \cdot 10^9}$$

$$(270 \cdot 10^6)\ (1 \cdot\ 10^9) = L^{3.5}$$

$$3.5 \ln L = \ln (270 \cdot 10^6) = \ln (1 \cdot 10^9)$$

$$\ln L = \frac{19.414 + 20.7233}{3.5}$$

$$\ln L = 11.468$$

$$L_e = 95{,}585 \text{ workers}$$

The level of unemployment is

$$L^* - L_e = 150{,}000 - 95{,}585$$

$$= 54{,}415 \text{ unemployed workers.}$$

b.

The market clearing wage is the wage that must be paid at full employment, even though there will be some shirking going on. Solve by inserting into the demand for labor equation the value of L^*.

$$W^* = (270{,}000{,}000)/(150{,}000^{1.5})$$

$$= \$4.648 \text{ per unit of time.}$$

c.

The efficiency wage (the wage to prevent shirking) is the wage that produces 95,588 employed workers. Thus:

$$W_e = (270{,}000)/(95{,}585^{1.5})$$

$$= (270{,}000)/(29{,}552{,}000)$$

$$= \$9.14 \text{ per unit of time.}$$

Diff: 3
Section: 17.5

105) Prestige University grants degrees only to high skill students who perform well for their eventual employers. Mediocre University grants degrees only to low skill students. The market demand for newly graduated high skilled workers is: $Q_H^D = 5{,}000 - \frac{1}{20}P^H$. The market demand for newly graduated low skilled workers is: $Q_L^D = 15{,}000 - \frac{1}{3}P^L$. Currently, Prestige University graduates 1,000 students while Mediocre University graduates 5,000. Determine the equilibrium prices for low and high skilled graduates. Suppose that in an effort to cut costs, the State has merged Prestige University and Mediocre University into State University. This merger has eliminated the signal that employers use to rely on to discern graduate quality. As a result, the demand for State University graduates is: $Q^D = 10{,}000 - \frac{23}{120}P$. The number of graduates from State University will be 6,000. Calculate the equilibrium price for State University graduates. Before the merger, would students at both Universities be willing to pay higher tuition in an effort to prevent the Universities from merging? Why or why not?

Answer: Before the merger, equilibrium in the high skill market requires: $1{,}000 = Q_H^D$. So, $1{,}000 = 5{,}000 - \frac{1}{20}P_H \Leftrightarrow P_H =$ \$80,000. Equilibrium in the low skill market requires: $5{,}000 = Q_L^D$. This implies: $5{,}000 = 15{,}000 - \frac{1}{3}P_L \Leftrightarrow P_L =$ \$30,000. If the two Universities merge, equilibrium in the new graduate market requires: $6{,}000 = Q^D$. This implies: $6{,}000 = 10{,}000 - \frac{23}{120}P \Leftrightarrow P =$ \$20,869.57. This market price for new graduates is below the price that graduates from both Universities received before the merger. Thus, students at both Universities would support tuition increases to prevent the merger.

Diff: 2
Section: 17.5

106) The professional baseball league on planet Economus allows team owners to draft players for life. Once a player is acquired in the draft, team owners may trade players to other teams. The demand for high quality players is: $Q_H^D = 2{,}000 - \frac{P_H}{1{,}000}$. The supply of high quality players is:

$Q_H^S = \frac{P_H}{3{,}000} - 500$. What is the lowest price necessary to induce an owner to trade a high quality player. Determine the equilibrium price and quantity of high quality players. The demand for low quality players is: $Q_L^D = 400 - \frac{P_L}{1{,}000}$. The supply of low quality players is:

$Q_L^S = \frac{P_L}{3{,}000} - 125$.

Determine the equilibrium price and quantity of low skill players. Now, suppose that only the team that has the rights to the player knows the quality of the player. This implies the new demand for players of uncertain quality is: $Q^D = 1{,}200 - \frac{P}{1{,}000}$. The supply of players becomes:

$$Q^S = \begin{cases} \frac{P}{3{,}000} - 125 & P < \$1{,}500{,}000 \\ \frac{P}{1{,}500} - 625 & P > \$1{,}500{,}000 \end{cases}$$

Derive the equilibrium price and quantity for players of uncertain ability. Do you believe any high quality players are being traded at this new market price?

Answer: The lowest price necessary to induce an owner to trade a high quality player is:

$Q_H^S > 0 \Rightarrow \frac{P_H}{3{,}000} - 500 > 0 \Leftrightarrow P_H > \$1{,}500{,}000$. Equilibrium in the high quality player market requires: $Q_H^S = Q_H^D \Rightarrow \frac{P_H}{3{,}000} - 500 = 2{,}000 - \frac{P_H}{1{,}000} \Leftrightarrow P_H = \$1{,}875{,}000$. The number of high quality players traded at this price is 125. Equilibrium in the low quality player market requires:

$Q_L^S = Q_L^D \Rightarrow \frac{P_L}{3{,}000} - 125 = 400 - \frac{P_L}{1{,}000} \Leftrightarrow P_L = \$393{,}750$. The number of low quality players traded at this price is 6.25. When player quality is not known, equilibrium in the market requires:

$Q^S = Q^D$. The supply curve now has two segments. For prices below \$1,500,000, owners do not trade any of their high skill players. If no high skill players are being traded, it must be that the price is less than \$1,500,000 when:

$Q^S = Q^D \Rightarrow \frac{P}{3{,}000} - 125 = 1{,}200 - \frac{P}{1{,}000} \Leftrightarrow P = \$993{,}750$.

This is the case. At this market price, 206.25 low quality players are brought to the market. Eventually when other team owners realize that only low quality players are being offered, demand will fall to the low quality demand specified above. As this happens, the market price for trading players drops back to \$393,750.

Diff: 3
Section: 17.5

107) Wiz–Bang Games is a new video game maker for the latest game console. As a new game maker, they have not established a reputation of providing quality games. The marginal cost to Wiz–Bang for manufacturing games is: $MC(Q) = 0.05Q$. The market price for low–quality games is \$20. The market price for high–quality games is \$65. If Wiz–Bang sells their product in the low quality market, calculate their producer surplus. If Wiz–Bang sells their product in the high quality market, calculate their producer surplus. If Wiz–Bang spends \$12,500 on marketing and packaging, they will be perceived as a high quality producer of video games. Should Wiz–Bang spend the \$12,500 to provide a signal to video game consumers of producing high quality games?

Answer: Since Wiz–Bang is a price taker, they will maximize profits in the low quality market by setting: $P = MC(Q) \Rightarrow \$20 = 0.05Q \Leftrightarrow Q = 400$. Producer surplus if Wiz–Bang operates in the low–quality market is: $PS = \frac{1}{2}(\$20)400 = \$4{,}000$. If Wiz–Bang is perceived as a high–quality producer of video games, their profit maximizing condition requires: $P = MC(Q) \Rightarrow \$65 = 0.05Q \Leftrightarrow Q = 1{,}300$. Producer surplus in the high quality market is: $PS = \frac{1}{2}(\$65)1{,}300 = \$42{,}250$. Spending \$12,500 on marketing and packaging and operating in the high quality market provides a larger return than operating in the low–quality market. Thus, Wiz–Bang should spend \$12,500 on marketing and packaging.

Diff: 2
Section: 17.5

108) Cecil's Home Appliances sells high quality washing machines. Cecil's marginal cost function is:

$MC^C(Q_C) = \frac{Q_C}{2}$. Zach's Appliances sells low quality washing machines. Zach's marginal cost function is: $MC^C(Q_Z) = \frac{Q_Z}{4}$. The market demand for high quality washing machines is:

$Q_H^D = 8{,}250 - 10P_H$. The market demand for low quality washing machines is:

$Q_L^D = 5{,}000 - 10P_L$. If Consumer's can distinguish between the quality of Cecil's and Zach's machines (and Cecil and Zach behave as price takers), determine the equilibrium price of washing machines. Calculate Cecil's producer surplus. Now, suppose that consumers can not distinguish between the quality of Cecil's and Zach's washing machines. In this case, the demand for washing machines is: $Q^D = 6{,}625 - 10P$. Determine the joint market supply curve. Calculate the equilibrium price of washing machines and the quantity brought to market by Cecil and Zach. What is Cecil's producer surplus? If Cecil offers a warranty on his washing machines, his marginal cost function becomes: $MC^C\left(Q_C^W\right) = \frac{5Q_C^W}{8}$. However, consumers will then perceive his machines to be high quality. Should Cecil offer the warranty?

Answer: In the high quality market, Cecil sets: $MC^C(Q_C) = P^H \Rightarrow \frac{Q_C}{2} = 825 - \frac{Q_C}{10} \Leftrightarrow Q_C = 1{,}375$.

Cecil's Producer Surplus is: $PS_C = \frac{1}{2}(687.50)1{,}375 = \$472{,}656.25$. If consumers cannot distinguish the quality of washing machines, the joint supply curve is: $Q^S = 6P$. Equilibrium in the washing machine market requires:

$Q^S = Q^D \Rightarrow 6P = 6{,}625 - 10P \Leftrightarrow \$414\frac{1}{16}$. At this price, Cecil sells 828.125 washing machines. Zach sells 1,656.25 washing machines. Cecil's producer surplus is:

$PS_C = \frac{1}{2}\left(414\frac{1}{16}\right)828\frac{1}{8} = \$171{,}447.75$.

If Cecil offers a warranty on his washing machines, his profit maximizing output level is: $MC^C(Q_C) = P^H \Rightarrow \frac{5Q_C}{8} = 825 - \frac{Q_C}{10} \Leftrightarrow Q_C = 1{,}137.931$. Cecil's producer surplus with the warranty is: $PS_C = \frac{1}{2}(711.21)1{,}137.931 = \$404{,}653.95$.

Cecil should offer the warranty to distinguish his washing machines from Zach's washing machines. This is because he raises producer surplus by doing so.

Diff: 3
Section: 17.5

109) Ron owns an automotive repair center. Ron provides high quality automotive repair. The market price for high quality service is $225 while the market price for standard service is $150. Currently, Ron only has a reputation for providing standard service. Ron's marginal cost function of providing high quality service is: $MC_H(Q) = 0.25Q$. Ron's marginal cost function of providing standard service is: $MC_S(Q) = 0.0625Q$. Butch's Marketing has told Ron that if he hires Butch's firm to advertise and market Ron's high quality services, consumers will pay him the high quality service market price providing he delivers that quality. What is the most amount of money Ron is willing to pay for Butch's services?

Answer: If Ron can sell his high quality service at high quality prices, his profit maximizing output level is: $MC_H(Q) = P_H \Rightarrow 0.25Q = \$225 \Leftrightarrow Q = 900$. Producer surplus in the high quality market is: $PS = 0.5(225)900 = \$101{,}250$. If Ron sells standard service at standard prices, his profit maximizing level of output is: $MC_H(Q) = P_H \Rightarrow 0.0625Q = \$150 \Leftrightarrow Q = 2{,}400$. Producer surplus in the standard quality market is: $PS = 0.5(150)2{,}400 = \$180{,}000$. Ron is unwilling to pay for Butch's marketing services because he makes a larger profit in the standard service market.

Diff: 2
Section: 17.5

110) Hart's Pinefall Lodge provides guided hunts and fishing trips to their customers in Ontario, Canada. The market price for high quality hunting and fishing trips is $1,250. The market price for standard quality hunting and fishing trips is $750. The marginal cost of providing high quality trips each season is: $MC(Q) = 156.25Q$. The marginal cost of providing standard quality trips each season is: $MC(Q) = 62.5Q$. In order to be able to sell their hunting and fishing trips at high quality prices, Hart's Pinefall Lodge must pay an advertising fee of $500 each season. Should the Lodge pay the fee and sell high quality trips?

Answer: If the Lodge caters to the high quality market, the profit maximizing level of output requires: $MC(Q) = P \Rightarrow 156.25Q = \$1{,}250 \Leftrightarrow Q = 8$. Producer surplus is: $PS = 0.5(\$1{,}250)8 = \$5{,}000$. Profits if the Lodge pays the advertising fee are $4,500. If the Lodge sells trips in the standard quality market, the profit maximizing level of output requires: $MC(Q) = P \Rightarrow 62.5Q = \$750 \Leftrightarrow Q = 12$. Producer surplus is: $PS = 0.5(\$750)12 = \$4{,}500$. Since profits to the Lodge are the same regardless of which market they cater to, Hart's Pinefall Lodge is indifferent to providing high quality or standard quality trips.

Diff: 2
Section: 17.5

111) Matthew drives a truck for Overtheroad Haulers. Matthew's marginal benefit for driving per day is: $MB(m) = 2{,}400 - 2m$, where m is the number of miles driven. The marginal social cost per mile is $MSC(m) = 2m$. Calculate the efficient number of miles driven for Matthew in a day. Since Overtheroad Haulers has full insurance on Matthew's truck, Matthew's personal marginal cost is: $MPC(m) = m$. How many miles per day will Matthew drive? Would it be efficient for society if Overtheroad Haulers places a limit on the number of miles Matthew drives? If so, what limit should they set?

Answer: Efficiency requires: $MB(m) = MSC(m) \Rightarrow 2{,}400 - 2m = 2m \Leftrightarrow m = 600$. Given Matthew is only concerned with his personal costs, Matthew's optimal number of miles driven is: $MB(m) = MPC(m) \Rightarrow 2{,}400 - 2m = m \Leftrightarrow m = 800$. At Matthew's choice for miles driven, the marginal social cost is \$1,600. The marginal benefit is \$800. If Overtheroad Haulers placed a limit of 600 miles per day, Matthew would be forced to drive the efficient number of miles.

Diff: 2
Section: 17.5

112) Jim's Hardware Supply has theft insurance. Jim also has an alarm system. The alarm system has just recently malfunctioned. If Jim has the alarm system repaired, it will cost him \$100. The probability of a theft occurring is $p = 0.0001$. If a theft occurs and there is no alarm system, the value of stolen materials will be \$125,000. However, Jim's insurance will compensate him fully for the loss. No thefts will occur if the alarm system is in place. What is the expected cost to Jim of repairing the alarm system? What is the expected cost to society of not repairing the alarm system?

Answer: Jim's private costs and the costs to society of repairing the alarm system are given in the table below. As the table illustrates, Society's expected costs are minimized if Jim has the alarm repaired. However, Jim's expected costs are minimized if he does not repair the alarm.

	Alarm Repaired	Alarm Unrepaired
Jim's Expected Cost	\$100	\$0
Society's Expected Cost	\$100	\$125

Diff: 2
Section: 17.5

113) Glen's friend Andre is a big strong guy. Andre will not allow anyone to harm Glen. Glen enjoys teasing people. In fact, Glen's marginal benefit of teasing people is given by: $MB(Q) = 75 - 10Q$. Generally, people do not enjoy Glen teasing them. Thus, they retaliate to Glen's teasing. Without Andre around to protect Glen from the retaliation, Glen's marginal cost of teasing people is $MC(Q) = 20Q$ due to the retaliation. However, with Andre around, Glen perceives his marginal costs of teasing to always be zero as no one will retaliate with Andre around. This is because Andre will step in to protect Glen from retaliation. Without Andre around, what is Glen's choice for teasing? How much does Glen increase teasing when Andre's around? Is Glen's behavior characteristic of a moral hazard or adverse selection?

Answer: Without Andre around, Glen will set: $MB(Q) = MC(Q) \Rightarrow 75 - 10Q = 20Q \Leftrightarrow Q = 2.5$. If Andre is present, Glen sets: $MB(Q) = 0 \Rightarrow 75 - 10Q = 0 \Leftrightarrow Q = 7.5$. Thus, Glen increases his teasing activities by 5 units. In this scenario, Andre is like an insurance policy for Glen. When Glen has his "insurance," he increases the activity that triggers payment by the insurer. Thus, Glen's behavior is characteristic of a moral hazard.

Diff: 2
Section: 17.5

114) Ty's Sporting Goods is considering rewarding employees with profit sharing for good performance. Without the sharing plan, Ty's total cost function is: $TC(Q) = 250Q + \frac{Q^2}{4}$ and his marginal cost function is: $MC(Q) = 250 + \frac{Q}{2}$. Ty can sell all his output for \$500. Calculate Ty's optimal output level. What is his level of profits? If Ty implements the profit sharing plan, his total cost function is: $TC(Q) = 125Q + \frac{Q^2}{4}$ and his marginal cost function is: $MC(Q) = 125 + \frac{Q}{2}$. If the profit sharing plan entitles his employees to 25% of the profits, should Ty institute the plan?

Answer: Without the profit sharing plan, Ty's profit maximizing level of output is given by:

$MC(Q) = P \Rightarrow 250 + \frac{Q}{2} = 500 \Leftrightarrow Q = 500$. Ty's profits are:

$TR(Q) - TC(Q) = 500(500) - 250(500) - \frac{500^2}{4} = \$62{,}500$. With the profit sharing plan, Ty's profit maximizing level of output is given by:

$MC(Q) = P \Rightarrow 125 + \frac{Q}{2} = 500 \Leftrightarrow Q = 750$. Ty's portion of the profits are:

$$\frac{3}{4}\{TR(Q) - TC(Q)\} = \frac{3}{4}\left\{500(750) - 125(750) - \frac{750^2}{4}\right\} = \$105{,}468.75.$$

Since Ty's profits increase, he should implement the profit sharing plan.

Diff: 2
Section: 17.5

115) Trisha's Fashion Boutique is considering a profit sharing arrangement with her employees. Currently, the employees receive an annual bonus. Trisha can sell all the output she produces for $150 per unit. Trisha's total cost function (including bonus payments to employees) is: $TC(Q) = 75Q + 2.5Q^2$. The marginal cost function is: $MC(Q) = 75 + 5Q$. The profit sharing plan would pay employees 30% of profits. However, due to greater cost saving initiatives from employees, Trisha's total cost function becomes: $TC(Q) = 50Q + 2Q^2$. The relevant marginal cost function becomes: $MC(Q) = 50 + 4Q$. Which plan offers Trisha the greatest profits for herself?

Answer: With the bonus plan, Trisha's profit maximizing output corresponds to: $MC(Q) = P \Rightarrow 75 + 5Q = 150 \Leftrightarrow Q = 15$. Trisha's profits are $562.50 at this output level with the employee bonus. With the profit sharing plan, Trisha's profit maximizing output corresponds to: $MC(Q) = P \Rightarrow 50 + 4Q = 150 \Leftrightarrow Q = 25$. Trisha's portion of the profits is 0.7($1,250) = $875. Trisha earns a larger profit for herself if she institutes the profit sharing plan.

Diff: 2
Section: 17.5

116) Trisha's Fashion Boutique is considering a profit sharing arrangement with her employees. Currently, the employees receive an annual bonus. In a "Boom" market, Trisha can sell all the output she produces for $225 per unit. In a "Bust" market, Trisha can sell all the output she produces for $125 per unit. The probability of a "Boom" market is 75% and the probability of a bust market is 25%. Trisha's total cost function (including bonus payments to employees) is: $TC(Q) = 75Q + 2.5Q^2$. The marginal cost function is: $MC(Q) = 75 + 5Q$. The profit sharing plan would pay employees 30% of profits. However, due to greater cost saving initiatives from employees, Trisha's total cost function becomes: $TC(Q) = 50Q + 2Q^2$. The relevant marginal cost function becomes: $MC(Q) = 50 + 4Q$. Which plan offers Trisha the greatest expected profits for herself? Suppose the employees will only approve a profit sharing plan if they are guaranteed their portion of profits will be at least $400. Will the employees approve of the profit sharing program?

Answer: The table below displays Trisha's profit maximizing output level and profits under each of the market scenarios.

	Bonus		Profit Sharing	
	Profit	*Output*	*Profit*	*Output*
Boom	$2,250	30	$2,679.6875	43.75
Bust	$250	10	$492.1875	18.75

The following table lists Trisha's employees' portion of the profits under the profit sharing program.

	Profit Share	Probability Weighted
Boom	$1,148.4375	$861.328125
Bust	$210.9375	$52.734375
Expected Value		$914.06

Since the profit sharing plan provides only $210.94 in a "Bust" market, the employees will not approve of the plan.

Diff: 2
Section: 17.5

117) Mr. Barnes operates a power plant in the local market. His marginal revenue of average employee effort level is: $MR(e) = 25 - e$. The marginal cost of effort to Mr. Barnes is: $MC(e) = w$. Employees set their effort level according to: $e = \frac{w - \overline{w}}{100}$, where $\overline{w}$ is the average wage at all other jobs in the local market. Currently, this average is \$7.50. If Mr. Barnes pays a wage rate of \$7.50, is he maximizing profits? If not, what wage rate should Mr. Barnes pay?

Answer: If Mr. Barnes sets the wage rate to \$7.50, employee effort level is 0. Mr. Barnes' marginal revenue of effort is: $MR(e = 0) = 25 > MC(e) = 7.50$. Mr. Barnes should offer a higher wage to increase employee effort. Mr. Barnes maximizes profits by setting: $MR(e) = MC(e) \Rightarrow 25 - e = w \Leftrightarrow e = 25 - w$. The optimal choice for Mr. Barnes must correspond with employee behavior. Thus, we set:

$25 - w = \frac{w - \overline{w}}{100} \Leftrightarrow w = \frac{2500 + \overline{w}}{101} = \$24.827$. At this wage rate, worker effort is: $e = 0.173$.

Mr. Barnes' marginal revenue of effort is \$24.827. This implies Mr. Barnes is maximizing profits at this wage rate.

Diff: 2
Section: 17.5

118) Ms. Moneynickel operates a retail store in the local mall. The marginal product of labor at the mall is a function of employee effort level. The marginal product of employee effort is: $MP_e(e) = 20 - e$. Ms. Moneynickel can sell all the product she stocks for \$20. Employees determine their effort level according to the function: $e = 10\left(w - \overline{w}\right)$, where $\overline{w}$ is the minimum wage. Currently, the minimum wage is \$6. The marginal cost to Ms. Moneynickel of effort is: $MC(e) = \frac{1}{10}$. What is the wage rate Ms. Moneynickel should offer her employees to maximize profits? If the minimum wage is increased by \$1, how much should Ms. Moneynickel increase the wage rate paid to her employees?

Answer: Ms. Moneynickel's marginal revenue of the product of effort is: $MRP_e(e) = MP_e gP = \left(20 - e\right)20 = 400 - 20e$. To maximize profits, Ms. Moneynickel must set: $MRP_e(e) = MC(e) \Rightarrow 400 - 20e = \frac{1}{10} \Leftrightarrow e = 20.005$. To gain this level of effort from her employees, $e = 10\left(w - \overline{w}\right) = 20.005 \Leftrightarrow w = 2.0005 + \overline{w}$. Thus, Ms. Moneynickel maximizes profits by paying her employees \$8.0005. If the minimum wage is increased by \$1, Ms. Moneynickel should raise her employee wage rate by \$1 or their effort will decline.

Diff: 2
Section: 17.5

Chapter 18 Externalities and Public Goods

1) Externalities
   A) are not reflected in market prices, so they can be a source of economic inefficiency.
   B) do become reflected in market prices, so they can be a source of economic inefficiency.
   C) are not reflected in market prices, so they do not adversely affect economic efficiency.
   D) do become reflected in market prices, so they do not adversely affect economic efficiency.
   E) may or may not become reflected in market prices, but do not have an impact on economic efficiency in either event.

   Answer: A
   Diff: 1
   Section: 18.1

2) Constructing plastic containers produces air pollutants. Therefore, in the market for plastic containers,
   A) the marginal social cost curve is above and to the right of the demand curve.
   B) the marginal social cost curve is below and to the left of the demand curve.
   C) the marginal social cost curve is above and to the left of the supply curve.
   D) the marginal social cost curve is below and to the right of the supply curve.
   E) there is a gap between quantity supplied and quantity demanded in equilibrium.

   Answer: C
   Diff: 1
   Section: 18.1

3) Dry cleaning of clothing produces air pollutants. Therefore, in the market for dry cleaning services, the equilibrium price
   A) and output are too low to be optimal.
   B) and output are too high to be optimal.
   C) is too low to be optimal, and equilibrium quantity is too high.
   D) is too high to be optimal, and equilibrium quantity is too low.
   E) is optimal, but there is an excess supply.

   Answer: C
   Diff: 1
   Section: 18.1

4) The presence of pollution in the dry cleaning industry leads in the long run to dynamic inefficiencies because
   A) people will buy fewer clothes that need dry cleaning than they otherwise would have.
   B) people will develop substitutes for dry cleaning that are wasteful.
   C) firms will be induced to leave the industry because of artificially high costs.
   D) firms whose average private cost is less than price will stay in (or enter) the dry cleaning industry even though their average social cost exceeds price.
   E) firms whose average private cost exceeds the price will exit (or fail to enter) the dry cleaning industry even though their average social cost is less than price.

   Answer: D
   Diff: 1
   Section: 18.1

5) Because trucking as an industry involves the generation of pollutants in engine exhaust,
   A) the supply curve of trucking services overstates the true cost of providing those services.
   B) the supply curve of trucking services understates the true cost of providing those services.
   C) the demand curve for trucking services overstates the true benefit of providing those services.
   D) the demand curve for trucking services understates the true benefit of providing those services.
   E) the market for trucking services will always be away from equilibrium by an amount equal to the value of the externality.

Answer: B
Diff: 1
Section: 18.1

6) Because air cargo as an industry involves the generation of pollutants in engine exhaust, the equilibrium price of air cargo services
   A) is above the optimal level, and quantity is below the optimal level.
   B) is below the optimal level, and quantity is above the optimal level.
   C) and quantity of trucking services are both above the optimal level.
   D) and quantity of trucking services are both below the optimal level.
   E) must fall in order for the market to reach equilibrium.

Answer: B
Diff: 1
Section: 18.1

7) The presence of pollution in the trucking industry leads in the long run to dynamic inefficiencies because
   A) marginal external cost rises over time.
   B) marginal external cost is constant over time.
   C) average private cost in trucking is lower than average social cost, so that some trucking firms remain in the industry (or are induced to enter) when efficiency calls for them to leave (or stay out).
   D) average private cost in trucking is higher than average social cost, so that some firms trucking firms exit the industry when efficiency calls for them to stay (or for more firms to enter).
   E) fewer resources are devoted to transportation than the economy really needs.

Answer: C
Diff: 1
Section: 18.1

8) Which of the following is a negative externality connected to automobile transportation?
A) Driving faster than the 65 mph speed limit is not allowed, even though individuals are able to do it, and many want to.
B) In an accident, a person who chooses not to wear a seat belt becomes an object moving around the inside of the car, possibly hitting other, belted–in, passengers with lethal force.
C) Gasoline is taxed on a per–gallon basis.
D) Gasoline is imported, and thus increases the trade deficit.
E) While stuck in traffic, you have a chance to listen to your favorite CD, which you haven't had the time to do in other places.

Answer: B
Diff: 2
Section: 18.1

9) The marginal benefit and marginal private cost curves for aphrodisiacs are given as follows:

$MB = 200 - Q$ $MPC = Q$

In addition to private costs, there is a marginal external cost of $10 per unit of output. What is the efficient level of output?
A) 0
B) 55
C) 95
D) 100
E) none of the above

Answer: C
Diff: 2
Section: 18.1

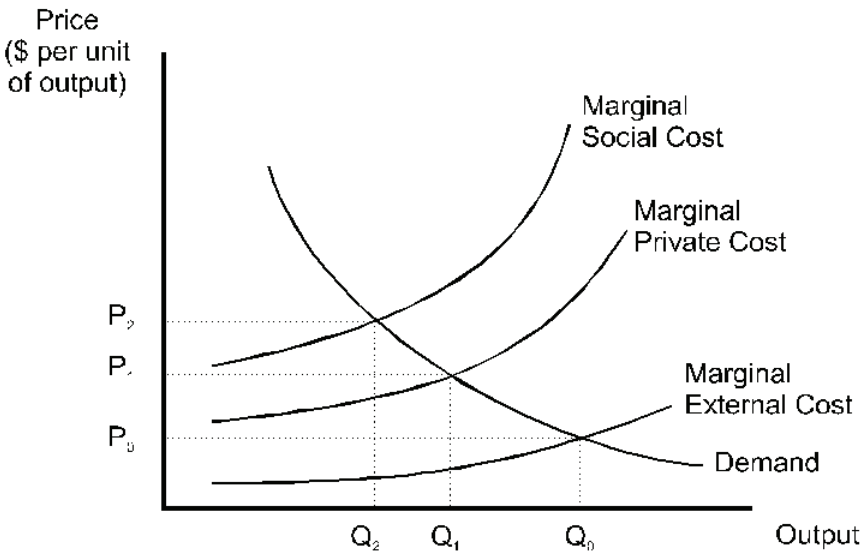


Figure 18.1

All producers in the corbomite industry dump wastes in the river in the production of their output.

10) Given the information in Figure 18.1, the competitive output in the corbomite industry is:
A) Q0. B) Q1.
C) Q2. D) any level as long as price is P0.

Answer: B
Diff: 2
Section: 18.1

11) Given the information in Figure 18.1, the efficient output in the corbomite industry is:
A) 0. B) Q0. C) Q1. D) Q2.

Answer: D
Diff: 2
Section: 18.1

12) Which of the following is a negative externality connected to attending college?
A) The fact that completion of a college degree acts as a signaling mechanism to employers.
B) The fact that other costs, such as books and materials, are incurred in addition to tuition and fees.
C) The fact that your college has required that all individuals living in student housing either get or show they have already obtained vaccinations against all communicable diseases.
D) The fact that the people in the next room play loud music at hours you want to sleep.
E) The fact that you will get benefits from college that you don't currently anticipate.

Answer: D
Diff: 2
Section: 18.1

13) Because of the kind of externalities that tend to be generated from general R&D resources bought by firms, the equilibrium price of R&D
A) is above the optimal level, and quantity is below the optimal level.
B) is below the optimal level, and quantity is above the optimal level.
C) and quantity of R&D are both above the optimal level.
D) and quantity of R&D are both below the optimal level.
E) must fall in order for the market to reach equilibrium.

Answer: D
Diff: 2
Section: 18.1

14) Due to externalities generated by home landscaping, its price
A) is above the optimal level, and quantity that is below the optimal level.
B) is below the optimal level, and quantity that is above the optimal level.
C) and quantity traded are both above the optimal level.
D) and quantity traded are both below the optimal level.
E) must fall in order for the market to reach equilibrium.

Answer: D
Diff: 2
Section: 18.1

15) A positive externality is shown by a marginal social benefit (MSB) curve that is
A) above and to the right of the demand curve for the good that generates it.
B) below and to the left of the demand curve for the good that generates it.
C) above and to the left of the supply curve for the good that generates it.
D) below and to the right of the supply curve for the good that generates it.
E) positively related to both the supply curve and the demand curve for the good that generates it.

Answer: A
Diff: 1
Section: 18.1

16) Loud music from a neighbor's party is
A) a negative externality whether or not you like it.
B) a positive externality whether or not you like it.
C) a positive externality if you like the music, and a negative externality if you don't.
D) a negative externality if you like the music, and a positive externality if you don't.
E) not an externality.

Answer: C
Diff: 1
Section: 18.1

17) Use the following statements to answer this question:
I. The efficient amount of recycling of scrap materials is the amount that equates the marginal social cost of scrap disposal to the marginal cost of recycling.
II. The efficient amount of recycling of scrap materials occurs when society recycles all recyclable wastes.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: B
Diff: 1
Section: 18.2

18) Use the following statements to answer this question.
I. The bubble concept allows an emitter to sum emission limits for all sources of pollutants within a particular firm, and to set emissions reductions from each source as it pleases as long as the total pollutant limit at the plant is not exceeded.
II. Under an emissions offsets program, a new source of emissions can locate in a region only if their new emissions are accompanied by reduced emissions from existing sources by at least as much.
A) Both I and II are true.
B) I is true, and II is false.
C) I is false, and II is true.
D) Both I and II are false.

Answer: A
Diff: 1
Section: 18.2

19) If a firm had a fixed proportions technology, then the pollution produced by this firm
A) cannot be reduced.
B) can be reduced only by lowering the level of output (holding technology constant).
C) can be reduced by changing how the output is produced within the bounds of the existing technology.
D) can be reduced only by increasing the number of firms in the industry.
E) can be reduced only by changing the technology.

Answer: B
Diff: 3
Section: 18.2

20) The optimum level of pollution emissions
A) is zero.
B) occurs where the marginal external benefit is zero.
C) occurs where no damage to the environment is being done.
D) occurs where the marginal external benefit equals the marginal external cost.
E) occurs where the marginal external cost equals the marginal cost of abatement.

Answer: E
Diff: 1
Section: 18.2

21) Given that $MEC(q) = 2q^2$, what can be inferred about the total cost of pollution as output increases?
A) The total cost of pollution is increasing.
B) The total cost of pollution is positive.
C) The total cost of pollution is growing at a positive rate.
D) The total cost of pollution is growing at an increasing rate.
E) The total cost of pollution is changing.

Answer: D
Diff: 2
Section: 18.2

22) When emissions are measured on the horizontal axis, the marginal cost of abating emissions is
A) downward–sloping because emissions become more and more easy to eliminate once the firm makes the initial commitment to do so.
B) downward–sloping because a high level of emissions is cheap to attain, and a low level of emissions is expensive to attain.
C) upward–sloping because emissions become more and more easy to eliminate once the firm makes the initial commitment to do so.
D) upward–sloping because a high level of emissions is cheap to attain, and a low level of emissions is expensive to attain.
E) horizontal because the technology to remove emissions is assumed constant.

Answer: B
Diff: 2
Section: 18.2

23) As you move rightward on a marginal cost of abatement curve, emissions are
A) falling, and the cost of eliminating the marginal unit falls.
B) rising, and the cost of eliminating the marginal unit falls.
C) falling, and the cost of eliminating the marginal unit rises.
D) rising, and the cost of eliminating the marginal unit rises.
E) rising, and the cost of eliminating the marginal unit is constant.

Answer: B
Diff: 1
Section: 18.2

24) Left alone, with no government interference, a profit–maximizing firm will produce emissions
A) where the MSB curve crosses the MCA curve.
B) at the vertical intercept of the MSB curve.
C) at the horizontal intercept of the MSB curve.
D) at the vertical intercept of the MCA curve.
E) at the horizontal intercept of the MCA curve.

Answer: E
Diff: 1
Section: 18.2

25) To enforce the optimum level of emissions a government could set an emissions standard at the quantity
A) where the MSB curve crosses the MCA curve.
B) located at the vertical intercept of the MSB curve.
C) located at the horizontal intercept of the MSB curve.
D) located at the vertical intercept of the MCA curve.
E) located at the horizontal intercept of the MCA curve.

Answer: A
Diff: 1
Section: 18.2

26) To enforce the optimum level of emissions, a government could set an emissions fee, which would be
A) the dollar value indicated by the intersection of the MSB and MCA curves, and would apply to every unit of pollutants the firm emitted.
B) the dollar value indicated by the intersection of the MSB and MCA curves, and would apply to every unit of pollutants the firm emitted above the standard.
C) the vertical intercept of the MSB curve.
D) the vertical intercept of the MCA curve.
E) the vertical distance between the intercepts of the MSB curve and the MCA curve.

Answer: A
Diff: 1
Section: 18.2

27) If the MSB/MCA graph indicates that an emissions fee of $10 per unit would lead to the optimum level of emissions, but the government set a fee of $5 per unit, emissions would
A) not be reduced at all.
B) not occur at all.
C) be above the optimum level, but curtailed somewhat from what they would have been with no fee at all.
D) be above the optimum level by 50%.
E) be below the optimum level by 50%.

Answer: C
Diff: 1
Section: 18.2

28) A firm will avoid producing additional emissions whenever the fee is
A) less than the MSB.
B) greater than the MSB.
C) less than the MCA.
D) greater than the MCA.
E) equal to the distance between MSB and MCA.

Answer: D
Diff: 1
Section: 18.2

29) Which is NOT an advantage of emissions fees over standards?
A) Fees can give a firm the incentive to reduce emissions below the standard when new technology allows.
B) Fees can reduce the cost of attaining some goal level of emissions when firms all have the same abatement costs.
C) Fees can reduce the cost of attaining some goal level of emissions when firms have different abatement costs and different standards can be assigned to different firms.
D) Fees can reduce the cost of attaining some goal level of emissions when firms have different abatement costs and different standards cannot be assigned to different firms.
E) Fees may provide an incentive for a firm to investigate emissions–reduction technology that will reduce emissions below existing standards.

Answer: C
Diff: 2
Section: 18.2

30) If error in setting the policy is possible,
A) a standard generates smaller welfare losses than a fee when the MSC and MCA are both relatively flat.
B) a standard generates smaller welfare losses than a fee when the MSC and MCA are both relatively steep.
C) a standard generates smaller welfare losses than a fee when the MSC is relatively steep and the MCA is relatively flat.
D) a standard generates smaller welfare losses than a fee when the MSC is relatively flat and the MCA is relatively steep.
E) errors in standards and fees have equal welfare losses, so long as the errors are the same in percentage terms.

Answer: C
Diff: 1
Section: 18.2

31) In equilibrium, the price of a transferable emissions permit
A) is constrained to the amount the government first charged for it.
B) equals the marginal cost of abatement for all firms.
C) equals the marginal cost of abatement for the firm with the highest cost, and exceeds the marginal cost of abatement of other firms.
D) equals the marginal cost of abatement for the firm with the lowest cost, and is less than the marginal cost of abatement of other firms.
E) equals the marginal social cost of emissions.

Answer: B
Diff: 2
Section: 18.2

32) Under a transferable emissions permit system,
A) the firms with the lowest marginal abatement cost curves will reduce emissions most.
B) the firms with the highest marginal abatement cost curves will reduce emissions most.
C) the firms with the lowest marginal social cost curves will reduce emissions most.
D) the firms with the highest marginal social cost curves will reduce emissions most.
E) all firms will reduce emissions equally.

Answer: A
Diff: 2
Section: 18.2

33) Under a transferable emissions permit system with n possible polluters, the government enforces the total amount of emissions allowable at X by
A) setting a different fee for each firm so that each firm chooses to emit X/n units.
B) setting the same fee for each firm so that each is forced to emit X/n units.
C) setting a different standard for each firm, with X/n being the average.
D) setting the same standard for each firm at X/n.
E) issuing X permits.

Answer: E
Diff: 2
Section: 18.2

34) If X transferable emissions permits are issued and there are n potential polluters,
A) the government must initially assign each of the potential polluters X/n permits.
B) the government must assign X/n permits to each potential polluter and check periodically that those permits have not moved.
C) emissions will be the same whether or not the permits are split equally, so long as none of the permits are issued outside the group.
D) emissions will be the same no matter who receives them first, so long as the recipient is willing and able to participate in the permit market.
E) emissions will be less if the permits are given initially to firms with lower abatement costs.

Answer: D
Diff: 2
Section: 18.2

35) Transferable permits allow emission reduction to be achieved
A) without any impact on the industrial sector, just as a standard would.
B) without any impact on the industrial sector, just as fees would.
C) at the lowest possible cost.
D) with firms monitoring each other, rather than having the government do the monitoring.
E) Both C and D are true.

Answer: C
Diff: 2
Section: 18.2

36) When new technologies make cleaner production possible,
A) emissions would fall under a system of fees, but would not fall under a system of transferable emissions permits unless the government bought back some of the permits.
B) emissions would fall under a system of permits, but would not fall under a system of fees unless the government raised them.
C) the price of transferable permits would rise.
D) the quantity of transferable permits would rise.
E) the quantity of transferable permits would fall.

Answer: A
Diff: 3
Section: 18.2

37) When new technologies make cleaner production possible,
A) emissions fees rise.
B) emissions fees fall.
C) the price of transferable permits rises.
D) the price of transferable permits falls.
E) the quantity of transferable permits falls.

Answer: D
Diff: 2
Section: 18.2

38) If households pay a fixed annual fee for trash disposal,
A) households will all tend to produce the same amount of garbage.
B) households have no incentive to cut back on the amount of garbage they generate.
C) that fee will provide households with an incentive to cut back on the amount of garbage they generate.
D) that fee will discourage households from throwing out reusable materials.
E) that fee will discourage households from throwing out toxic or otherwise harmful materials.

Answer: B
Diff: 2
Section: 18.2

39) If households could be charged differently for different types of garbage,
A) the total amount of garbage would be reduced.
B) recycling would be more difficult.
C) costs of collecting garbage could be kept much lower.
D) billing for garbage collection would be much easier.
E) there would be a change in the types of items that are disposed of as garbage.

Answer: E
Diff: 2
Section: 18.2

40) The efficient level of recycling equates the
A) marginal cost of scrap disposal to the marginal benefit from not using virgin materials.
B) marginal cost of recycling to the marginal benefit from not using virgin materials.
C) marginal cost of scrap disposal to the marginal cost of recycling.
D) marginal private cost of disposal to the marginal cost of recycling.
E) per–unit refund from recycled materials to the marginal benefit from not using virgin materials.

Answer: C
Diff: 1
Section: 18.2

41) Having a refundable deposit for recyclable material
A) raises the marginal private cost of disposal.
B) raises the marginal social cost of disposal.
C) lowers the marginal private cost of disposal.
D) lowers the marginal social cost of disposal.
E) does not affect disposal costs.

Answer: A
Diff: 1
Section: 18.2

42) Menell's study showed that in terms of effectiveness,
A) mandatory separation of recyclables was best, followed by curbside charges and finally refundable deposits.
B) mandatory separation of recyclables was best, followed by refundable deposits and finally curbside charges.
C) curbside charges were best, followed by refundable deposits and finally mandatory separation of recyclables.
D) curbside charges were best, followed by mandatory separation of recyclables and finally refundable deposits.
E) refundable deposits were best, followed by curbside charges and finally mandatory separation of recyclables.

Answer: E
Diff: 1
Section: 18.2

43) Which is NOT a weakness of the policy of mandatory separation of recyclables?
A) It actually pays people to use more recyclable material, and thus more material in total.
B) It is costly for households in terms of time spent.
C) It is costly for the government to monitor.
D) Individuals may shift away from recyclable to non–recyclable materials just so they don't have to bother to separate them.
E) Implementation is difficult and consumes household space.

Answer: A
Diff: 2
Section: 18.2

44) In general, the current stock of pollutants (S_t) may be modeled as $S_t = E_t + (1 - \delta)S_{t-1}$ where δ is the _____ and E_t is the _____.
A) social discount rate, previous stock level
B) social discount rate, current emissions
C) stock dissipation rate, previous stock level
D) stock dissipation rate, current emissions

Answer: D
Diff: 1
Section: 18.3

45) Use the following statements to answer this question:
I. Stock externalities depend on the accumulated results of actions by producers or consumers, not on the incremental results that may occur in a given period of time.
II. Stock externalities are always negative externalities.
A) I and II are true.
B) I is true and II is false.
C) II is true and I is false.
D) I and II is false.

Answer: B
Diff: 1
Section: 18.3

46) Even if we were able to completely eliminate greenhouse gas (GHG) emissions today, the problems associated with the accumlated stock of GHGs in the atmosphere will persist for a long time because:
A) their dissipation rate is very low.
B) their dissipation rate is very high.
C) the social discount rate is very low.
D) the social discount rate is very high.

Answer: A
Diff: 1
Section: 18.3

47) Suppose the current stock of greenhouse gases in the atmosphere is 100 million tons, the stock dissipation rate is 0.02, and we will emit 4 million tons into the atmosphere this year. What is the stock level of greenhouse gases expected to be for next year?
A) 98 million tons
B) 100 million tons
C) 102 million tons
D) 104 million tons

Answer: C
Diff: 1
Section: 18.3

48) The social discount rate is an important component in net present value (NPV) calculations for public policies related to stock externalities, but economists do not agree on which value to use for this rate. Suppose a recent study reports that the NPV of a proposed carbon tax intended to reduce carbon dioxide emissions is positive, but the annual net benefits do not become positive until 2060. The authors of the study used a social discount rate of 2%. What can we say about the findings of the study if the research were repeated with a higher social discount rate?
A) NPV would increase, and the annual net benefits would become positive after 2060.
B) NPV would decline, and the annual net benefits would become positive before 2060.
C) NPV would decline, and the annual net benefits would not change.
D) The findings of the study would not change.

Answer: A
Diff: 1
Section: 18.3

49) Plants, trees, and soils naturally emit carbon dioxide (CO2) that enters the atmosphere. To form a benchmark level for this greenhouse gas, we can determine the amount of CO2 that would end up in the atmosphere if there were no human activity on the planet. Suppose naturally occurring CO2 emissions are 5 million tons per year, the social discount rate is 5%, and the stock dissipation rate is 2%. What is the eventual level of CO2 in the atmosphere if these natural emissions continue at this rate forever?

A) 100 million tons
B) 250 million tons
C) 25 million tons
D) We do not have enough information to answer this question.

Answer: B
Diff: 2
Section: 18.3

50) Which of the following examples is NOT a negative stock externality?

A) Goodwill generated by a company
B) Noise pollution from an airport
C) Odors emitted from a paper mill
D) None of these cases are examples of negative stock externalities

Answer: D
Diff: 2
Section: 18.3

51) Which of the following factors influence the appropriate value for the social rate of discount used in NPV analysis of stock externalities?

A) Expected rate of economic growth
B) Extent of social risk aversion
C) The society's rate of time preference
D) all of the above

Answer: D
Diff: 2
Section: 18.3

52) When there are externalities, economic efficiency can be achieved without government intervention

A) at no time.
B) when the externality affects many people and property rights are not well defined.
C) when the externality affects many people and property rights are well defined.
D) when the externality affects only a few parties and property rights are not well defined.
E) when the externality affects only a few parties and property rights are well defined.

Answer: E
Diff: 2
Section: 18.4

53) In which of these situations would the Coase theorem be MOST likely to work?
A) A thousand firms use a lake, there are no other users, all their costs could be reduced somewhat by polluting, but all would have lower water intake costs if the lake were clean.
B) A group of nine firms use a lake, there are no other users, all their costs could be reduced somewhat by polluting, but all would have lower water intake costs if the lake were clean.
C) Worldwide deep sea fishing rights need to be negotiated among thousands of fishermen from different countries.
D) One hundred and fifty nations need to come to an accord about CFC generation to combat ozone depletion.
E) A group of chemical firms high upstream on the Mississippi River have emissions that affect not only communities downstream along the river, but around the Gulf of Mexico as well.

Answer: B
Diff: 2
Section: 18.4

Scenario 18.1:
It is the factory's choice whether to install a filter. It is the choice of the nearby fishermen whether to install a treatment plant. Dollar figures show profit. The factory and the fishermen can negotiate costlessly, and no one else is affected by the result.

		Factory	Fishermen
A:	No filter or treatment plant	$10,000	$2,000
B:	Filter; no treatment plant	$6,000	$10,000
C:	No filter; treatment plant	$10,000	$4,000
D:	Filter; treatment plant	$6,000	$6,000

54) Refer to Scenario 18.1. What should the fishermen do if they know the factory will maximize profits and no negotiation is possible?
A) Install a treatment plant.
B) Do not install a treatment plant.
C) It makes no difference if the fishermen do or do not install a treatment plant.
D) Install a filter.
E) Exit the industry.

Answer: A
Diff: 1
Section: 18.4

55) Refer to Scenario 18.1. It would be acceptable to both parties to have the fishermen pay the factory
A) $0 to install a filter.
B) $500 to install a filter.
C) $4,000 to install a filter.
D) $6,000 to install a filter.
E) any amount greater than $4,000 and less than $6,000 to install the filter and make both parties better off.

Answer: E
Diff: 2
Section: 18.4

56) Refer to Scenario 18.1. Which of the following is TRUE?
A) The factory will never agree to B, because that would leave them with much less profit than the fishermen.
B) C will never occur because that would leave the fishermen with much less profit than the factory.
C) If the factory refused to install a filter, the fishermen would refuse to install a treatment plant.
D) The factory must install a filter, because they contaminate the water.
E) The profits above indicate profit before any agreement is made, and profit varies enough to make a mutually acceptable agreement possible.

Answer: E
Diff: 2
Section: 18.4

57) Under Scenario 18.1, suppose the body of water lies on an international boundary, and the fishermen speak a different language than the factory managers. The efficient outcome cannot be achieved if the cost of hiring translators for both parties:
A) is less than $4,000.
B) equals $5,000.
C) is greater than $6,000.
D) none of the above

Answer: C
Diff: 2
Section: 18.4

58) Refer to Scenario 18.1. If the fishermen are given the right to clean water,
A) the outcome will be more efficient than if the factory is given the right to use the water as it sees fit.
B) the outcome will be less efficient than if the factory is given the right to use the water as it sees fit.
C) the efficient outcome will occur no matter who is given which property right, and the individual gains will be the same in each case.
D) the factory will be forced to shut down.
E) the efficient outcome will occur no matter who is given which property right, but how that maximum gain is split will be determined during bargaining.

Answer: E
Diff: 2
Section: 18.4

59) In the case in Scenario 18.1, the Coase theorem specifies that
A) the result will be different if the fishermen are given the right to clean water than it will be if the factory is given the right to use the water as it sees fit, but the result will be inefficient in either case.
B) the efficient result will occur whether the fishermen are given the right to clean water or the factory is given the right to use the water as it sees fit.
C) economic efficiency requires that the fishermen be given the right to clean water.
D) economic efficiency requires that no one may contaminate the water.
E) economic efficiency requires that the fishermen be given the right to clean water and that the factory be given the right to use the water as it sees fit.

Answer: B
Diff: 2
Section: 18.4

60) A lawsuit seeking compensation for damage from pollution
A) will ruin any chances the Coase theorem has of working to avoid the situation in the first place.
B) is a substitute for bargaining, but an inefficient one.
C) is a substitute for bargaining, and it can lead to the efficient solution.
D) is preferable to switching the property rights between the parties.
E) is how the Coase theorem was meant to work in the first place.

Answer: C
Diff: 2
Section: 18.4

61) Suppose your neighbor likes to repair motorcycles in his front yard during evenings and on weekends, and he earns $400 per week from this work. However, the sight of piles of greasy motorcycle parts and the additional noise and traffic caused by his customers reduces your value of living in this neighborhood by $300 per week. If your neighbor has a right to operate this business, what is the efficient outcome?
A) He continues to operate the business.
B) You can pay him to move the business to another location.
C) He pays you to let him continue working on motorcycles at his home.
D) There is no efficient outcome from this situation.

Answer: A
Diff: 2
Section: 18.4

62) Suppose your neighbor likes to repair motorcycles in his front yard during evenings and on weekends, and he earns $400 per week from this work. However, the sight of piles of greasy motorcycle parts and the additional noise and traffic caused by his customers reduces your value of living in this neighborhood by $500 per week. If your neighbor has a right to operate this business, how can you achieve the efficient outcome?
A) You cannot afford to pay him enough money to stop working on motorcycles, and he continues to operate the business.
B) You pay him some value between $0 and $100 to close his home business.
C) You pay him some value between $400 and $500 to close his home business.
D) You pay him at least $500 to close his home business.

Answer: C
Diff: 1
Section: 18.4

63) Suppose your neighbor likes to repair motorcycles in his front yard during evenings and on weekends, and he earns $400 per week from this work. However, the sight of piles of greasy motorcycle parts and the additional noise and traffic caused by his customers reduces your value of living in this neighborhood by $300 per week. If you have a right to live in peace and quiet, how can you achieve the efficient outcome?
A) He cannot afford to pay you enough money to allow him to work on motorcycles.
B) He pays you some value between $0 and $100 to allow his home business.
C) He pays you some value between $300 and $400 to allow his home business.
D) He pays you at least $400 to allow his home business.

Answer: C
Diff: 1
Section: 18.4

64) Suppose your neighbor likes to repair motorcycles in his front yard during evenings and on weekends, and he earns $400 per week from this work. However, the sight of piles of greasy motorcycle parts and the additional noise and traffic caused by his customers reduces your value of living in this neighborhood by $300 per week. If you have a right to live in peace and quiet, the efficient outcome can be achieved as long as the bargaining costs:
A) are less than $100.
B) are greater than $100.
C) only include opportunity costs.
D) The Coase Theorem assumes zero transaction costs, so the bargaining costs must be zero in order to achieve the efficient outcome.

Answer: A
Diff: 1
Section: 18.4

65) Common property rights
A) increase efficiency over individual property rights.
B) enable the Coase theorem to work.
C) are responsible for the increasing success of preservation of African elephants.
D) are responsible for the increasing success of preservation of worldwide fishing resources.
E) result in faster depletion of resources than do individual property rights.

Answer: E
Diff: 1
Section: 18.5

66) Which of the following move the handling of a common property resource closest to efficiency?
A) ensuring that the sellers of the resource are perfectly competitive
B) ensuring that the seller of the resource is a monopolist
C) banning the sale of the resource
D) banning the use of the resource
E) assigning a usage fee for access to the resource

Answer: B
Diff: 2
Section: 18.5

67) Common property resources tend to be
A) overused.
B) underused.
C) not used at all.
D) efficiently used.
E) used by the government only.

Answer: A
Diff: 1
Section: 18.5

68) One difficulty in managing common property resources is that
A) the monopoly firm that owns such a resource typically has great economic power, so that breaking it up into smaller firms is not practical.
B) the monopoly firm that owns such a resource typically is a natural monopoly, so that it is undesirable to break it up into smaller firms.
C) many common property resources are so small that management would have to be done on a micro level, greatly increasing government activity in the economy.
D) many common property resources are so vast that single ownership or management of them is not practical, especially if they cross international borders.
E) more and more of them come into being as pollution increases.

Answer: D
Diff: 2
Section: 18.5

69) Common property resources like fish stocks in open waters tend to be over–utilized because:
A) the marginal social cost is less than the private marginal cost.
B) the marginal social cost is always equal to the private marginal cost.
C) the marginal social cost is greater than the private marginal cost.
D) none of the above

Answer: C
Diff: 1
Section: 18.5

70) The difference between the marginal social cost and the private cost of a common property resource represents:
A) the social discount rate.
B) a deadweight loss.
C) is generally negative because the people who use the resources assign higher value to them than other members of society.
D) the opportunity cost of reducing the resource by one unit for other members of society.

Answer: D
Diff: 2
Section: 18.5

71) Which of the following is NOT an example of a common property resource?
A) Water in underground aquifers
B) Public highways in large cities
C) Fish stocks in open waters
D) Outdoor concerts

Answer: D
Diff: 1
Section: 18.5

72) For some fisheries in the U.S., the state or federal government imposes "gear restrictions" that limit the size of boats, nets, or other equipment that may be used to harvest the fish in a given body of water. The purpose of the gear restrictions is to:
A) prevent everyone from using the common property resource (fish).
B) make it harder for other members of society to harvest the resource. This reduces the opportunity cost of the resource for other members of society, and the marginal social cost is closer to the private cost.
C) increase the private cost of using the resource so that the private cost is closer to the marginal social cost.
D) maintain traditional ways of harvesting fish, which is valuable for promoting tourism.

Answer: C
Diff: 2
Section: 18.5

73) Suppose the private marginal cost of pumping water from an aquifer remains constant as the quantity of water pumped increases, and the marginal social cost is upward sloping. If the demand for water shifts to the right as population increases, then the amount of water pumped based only on private costs _____ and the social cost of the common property resource _____.
A) decreases, decreases.
B) decreases, increases
C) increases, decreases
D) increases, increases

Answer: D
Diff: 2
Section: 18.5

74) Which of the following is a public good?
A) Telephone service
B) Broadcast TV
C) A daily newspaper
D) The Red Cross
E) all of the above

Answer: B
Diff: 2
Section: 18.6

75) Corn flakes are
A) a rival good because many firms produce them.
B) a rival good because if another person wants some corn flakes society has to use additional resources to produce corn flakes for that person.
C) a non–rival good because there are only a few firms in the industry.
D) a non–rival good because even if another person wants some corn flakes so many corn flakes are produced that no additional resources are used to satisfy this new customer's needs.
E) a public good.

Answer: B
Diff: 2
Section: 18.6

76) Access to the movie "Casablanca," showing in a half–empty theater, is
A) a public good because individuals watch movies together.
B) a public good only if the theater is run by the government.
C) not a public good because it is a rival good.
D) not a public good because it is an exclusive good.
E) not a public good because it is both a rival good and an exclusive good.

Answer: D
Diff: 2
Section: 18.6

77) Access to the movie "Casablanca," showing in a half–empty theater, is
A) a rival good because other movies are available in other theaters.
B) a rival good because it is used up as it is seen. It is not enjoyed as a whole all at once.
C) a rival good because individuals were willing and able to pay a positive amount to get in to the theater.
D) a non–rival good because no other movie is available in that theater.
E) a non–rival good because when a new viewer enters the theater, there is not less of the movie for everybody else.

Answer: E
Diff: 2
Section: 18.6

78) A lighthouse is a public good
A) because it doesn't cost any more to light the way for 105 ships than it does to light the way for 104 ships, but for no other reason.
B) because there is no way to prevent those who haven't contributed to the lighthouse from seeing better because of it, but for no other reason.
C) because the government produces it, and for no other reason.
D) for the reasons in A and B together.
E) for the reasons in A, B, and C together.

Answer: D
Diff: 1
Section: 18.6

79) The provision of an education in public school is
A) exclusive and rival.
B) exclusive and non–rival.
C) nonexclusive and non–rival.
D) nonexclusive and rival.
E) a public good, regardless of exclusivity and rivalness.

Answer: A
Diff: 1
Section: 18.6

80) The government provides public education because
A) public education is a public good.
B) public education is non–rival and nonexclusive.
C) private education is rival and exclusive.
D) public education combats the negative externalities of private education.
E) public education provides positive externalities.

Answer: E
Diff: 1
Section: 18.6

81) To find the social marginal benefit of public goods, one needs to
A) sum the consumers' demand curves vertically.
B) sum the consumers' demand curves horizontally.
C) sum the marginal private benefit and the marginal external benefit for each unit.
D) sum the marginal private cost and the marginal external cost for each unit.
E) subtract the individual portion of the tax burden necessary for the government to provide the good from the demand curve of each consumer who desires the good.

Answer: A
Diff: 1
Section: 18.6

82) A consumer or producer who does not pay for use of a nonexclusive good but expects others to pay is known as a:
A) free rider.
B) price setter.
C) fringe element.
D) none of the above

Answer: A
Diff: 1
Section: 18.6

83) Majority–rule voting
A) is economically efficient.
B) is never economically efficient.
C) may or may not be efficient, depending upon the preferences of the voters.
D) is economically efficient only in a democracy.
E) is economically efficient only if there is a median voter.

Answer: C
Diff: 1
Section: 18.7

84) Majority–rule voting
A) usually emphasizes the preferences of extremist voters on one side or the other.
B) usually allows extremist voters to band together and swamp the preferences of the median voter.
C) never reflects the preferences of the median voter.
D) reflects the preferences of the median voter.
E) generates economically efficient outcomes in most cases.

Answer: D
Diff: 1
Section: 18.7

85) Efficient voting outcomes would assign weights to each vote that are:
A) equal.
B) egalitarian.
C) higher for the median voter and lower for other voters.
D) proportional to the voter's strength of preference.

Answer: D
Diff: 2
Section: 18.7

86) The market for paper in a particular region has the supply and demand curves:

$Q_D = 160{,}000 - 2{,}000P \quad Q_S = 40{,}000 + 2{,}000P,$

where Q is measured in hundred–pound lots, and P is price per hundred–pound lot. There is currently no attempt to regulate the dumping of effluent into streams and rivers by the paper mills. As a result, dumping is widespread. The marginal external cost associated with the paper production is given by the expression:

$MEC = 0.0002Q.$

a. Calculate the competitive price and output, assuming that no attempt is made to monitor or regulate the dumping of effluent.
b. Determine the socially optimal levels for price and output. If your answers in (a) and (b) are different, explain the source of the difference.
c. Sketch a diagram showing the costs or benefits to society of allowing the market to operate in an unregulated fashion.

Answer: ***a.***

Solve for P in the demand and supply equations

$P = 80 - 0.0005Q_D$

$P = 20 + 0.0005Q_S$

Equate demand and supply

$80 - 0.0005Q = 20 + 0.0005Q$
$60 = 0.001Q$
$Q = 60{,}000$
$P = 20 + 0.0005(60{,}000)$
$P = 20 + 30$
$P = 50$

b.

Socially optimal level is where demand intersects MSC

$MSC = MC + MEC$

MC is equal to supply

$MSC = (20 + 0.0005Q) + 0.0002Q$
$MSC = 20 + 0.0007Q$

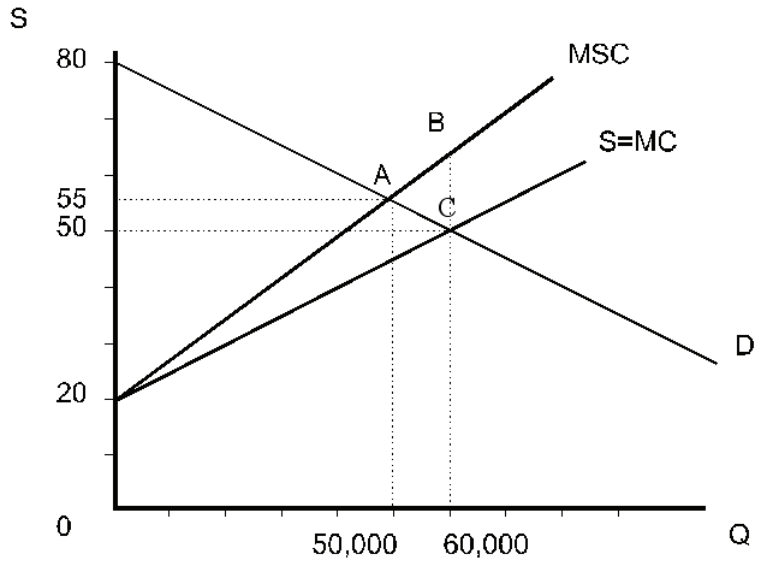
Equate demand to MSC

$80 - 0.0005Q = 20 + 0.0007Q$
$60 = 0.0012Q$
$Q = 50{,}000$
$P = 20 + 0.0005(50{,}000)$
$P = 55$

Optimal price is \$55, quantity is 50,000.

The difference between competitive outcome and the socially optimal outcome occurs because the private market is not capturing all of the costs.

c.
To determine social loss, sketch the free market outcome.



The free market outcome (point C) must be compared to the socially optimal outcome at point A.
ABC is the loss to society. It represents the difference between MSC and demand for the units of output between 50,000 (optimal output) and 60,000 (competitive output).

Diff: 2
Section: 18.1

87) When peach canners process fresh peaches, they produce three products. The first, canned peaches, is sold in the marketplace. The others, liquid and solid wastes, are by–products that must be removed. The liquid is sometimes temporarily kept in holding ponds and later released into a nearby stream or sewer. Liquid dumped in the stream represents a negative externality to downstream users. In the peach growing region, the marginal external costs of the canning process have been estimated as:

MEC = 0.000043Q,

where Q represents output of canned peaches in cases per week. The marginal cost of canning peaches (ignoring MEC) is:

MC = 2.00 + 0.000157Q,

and the demand for canned peaches is:

P = 9.00 – 0.000243Q.

a. How many cases of peaches will be produced per week during the growing season, and what will the selling price per case be if producers ignore the costs imposed on others?
b. If producers are forced to incorporate the marginal external costs into their production decisions, what will the new production rate and selling price be?
c. In taking account of the external costs imposed on others (part b), what was the impact on the selling price and production rate of canned peaches? Explain the impact on market efficiency.

Answer: ***a.***

The output rate is determined where the marginal costs of production (supply) equal demand. Equilibrium output rate is:

MC = demand
2.00 + 0.000157Q = 9.00 – 0.000243Q
Q = (9 – 2)/0.00040 = 17,500 case/week

The selling price is determined by demand.

P = 9 – 0.000243(17,500) = 4.7475 = $4.75/case

b.

The MPC and MEC must be added (vertically) to determine the marginal social cost of production (MSC). This expression is equated to demand to determine the production rate.

MSC = MC + MEC
= 2 + 0.000157Q + 0.000043Q
= 2 + 0.0002Q
MSC = 2 + 0.0002Q = 9 – 0.000243Q = demand
Q = (9 – 2)/0.000443 = 15,801 case/week

The new selling price is:

P = 9 – 0.000243(15,801) = $5.16/case

c.

As a result of internalizing the MEC, the canning industry produced fewer cases per week (17,500 – 15,801 = 1,699). Also, the selling price increased form $4.75/case to $5.16/case. Market efficiency was increased when the price increased by increasing price and reducing output. The market is efficient because MSC equals selling price.

Diff: 2
Section: 18.1

88) When a man invests in controlling weeds and trash that tend to accumulate in his yard, both he and his neighbors benefit from his action. Is an externality associated with his private decision? If so, explain its effect, and determine whether the efficient level of weed control occurs when the individual invests in weed control.

Answer: When a man invests in weed and trash control and his neighbors benefit, but do not contribute to the effort, then too little investment will be made. The level of investment (weed and trash control) will be determined where his demand (marginal private benefit curve) intersects his marginal cost of control curve. Call this level of control q1. Since others benefit, there is a positive externality which means that the efficient level of weed and trash control q2 is above the actual level.

Diff: 1
Section: 18.1

89) The demand for injections to immunize against a disease is given as:

P = 13 0.0005Q,

where P = price in dollars, and Q = quantity measured as number of shots per month. The marginal social benefit function has the same vertical intercept as the demand curve and one half the slope (one half in absolute value). The marginal cost of injections is a constant $8.

a. With a competitive market, what price and quantity will prevail, assuming that there is no government intervention?
b. Explain why the demand curve and marginal social benefit functions are different in this case. What is the socially optimal quantity in the market?
c. What government policies could be used to bring about the optimal outcome?

Answer: ***a.***

Under competition P = MC

13 – 0.0005Q = 8
–0.0005Q = –5
Q = 10,000
P = $8

b.

MSB differs from demand because there are benefits accruing to individuals other than the person immunized. MSB has the same intercept and one half the slope.

MSB = 13 – 0.00025Q

Optimality requires that MSB equal MC.

13 – 0.00025Q = 8
–0.00025Q = –5
Q = 20,000

c.

In the case of external benefits, the appropriate government strategy is a subsidy.

Diff: 2
Section: 18.1

90) The food processing industry involves the canning of fruit products, among other things, and the canning process produces canned goods and waste products. The manufacturer of one kind of fruit product produces an external cost for third parties. This external cost is expressed as:

MEC = 0.00005Q,

where MEC represents marginal external cost (dollars/unit), and Q represents cases produced per week. The marginal cost of production (supply), ignoring MEC, at the industry level is:

MC = 2 + 0.000175Q.

The industry demand for the product is:

P = 10 – 0.00025Q,

where price P is in dollars per unit.

a. Determine the output rate and price that would be established by profit maximizing firms.
b. Determine the efficient output rate and price.
c. Determine the cost to society of firms producing at the profit maximizing rate rather than at the efficient output rate.

Answer: ***a.***

The profit maximizing production rate is based on demand and the industry's marginal cost of production, ignoring MEC. Thus we equate MC with demand to get Q:

MC = demand
2 + 0.000175Q = 10 – 0.00025Q
Q = (10 – 2)/0.000425 = 18,824 cases per week

The selling price is:

P = 10 – 0.00025(18,824) = $5.294 per case.

b.

The efficient output rate is based on the social costs and demand.

MSC = MC + MEC
= 2 + 0.000175Q + 0.00005Q
= 2 + 0.000225Q
MSC = demand
2 + 0.000225Q = 10 – 0.00025Q
Q = (10 – 2)/0.000475 = 16,842 cases per week

The selling price is:

P = 10 – 0.00025(16,842) = $5.79 per case.

c.

The social cost of not producing at the efficient market rate is the area between MSC and demand between Q of 16,842 and 18,824. The average height, Havg, is:

Height at Q = 18,824 = H_1 = –8 + 0.000475(18,824)
= 0.9414
Height at Q = 16,842 = H_2 = –8 + 0.000475(16,842)
= 0.0000
Havg = (H_1 + H_2)/2 = (0.9414 + 0)/2 = 933.52

Thus, the social loss is $933.52 per week.

Diff: 2
Section: 18.1

91) Consider a situation in which the government has limited information about costs and benefits of pollution abatement associated with a given industry. However, it is known that the marginal social cost curve for emissions is much steeper than the marginal cost of abatement curve (in absolute terms). In this situation, which method of emissions control is preferable when the greatest concern is with accuracy of control rather than the cost of control? That is, should a fee be used or should a standard be used? Explain.

Answer: In this problem, a standard is preferable to a fee. The reason is that for a given percent error in either method, the fee produces a much bigger social cost. One should note, when information is not complete, standards offer more certainty about emissions levels, but leave the costs of abatement uncertain. Fees offer more certainty about costs, but leave reductions in emissions uncertain.

The relative slopes of the curves are important in determining which method of control yields the greatest variation in possible increase in social cost.

Diff: 2
Section: 18.2

92) The marginal social costs and abatement costs of a certain type of air pollution for a factory are given as:

MSC = –1121 + 22.5Q MCA = 879 – 17.5Q,

where Q = units of pollution per day, and MSC and MCA are measured in dollars. The factory is located in a small town that is currently setting community standards. You have been hired to perform the analysis requested below.

a. If the community wishes to set a pollution standard for the factory, what daily level of pollution should be allowed?
b. As an alternative, some members of the town council favor an emissions tax for the factory. If a tax is implemented, at what level should the tax be set?

Answer: ***a.***

To determine the optimal level of pollution, we equate MSC to MCA

–1121 + 22.5Q = 879 – 17.5Q
–2,000 = –40Q
Q = 50

50 units of pollution is optimal.

b.

To determine tax, examine MSC or MCA at optimal level.

MCA = 879 – 17.5(50)
MCA = 4
set tax = MCA = MSC = 4.

Diff: 2
Section: 18.2

93) The most popular state park in the Craggy Mountains recently reached the point where a common property resources problem arose — too many people hunted for wild boar each season. The boar population became over hunted and was in peril of extinction. An economist at the local university studied the problem for the park management and estimated the following cost and revenue relationships:

Demand: $P = 10 - 0.008Q$
Marginal social cost: $MSC = 1.00 + 0.0067Q$
Marginal private cost: $MPC = 1.00 + 0.0010Q$.

The variable Q represents the number of boars killed each season and price P is in hundreds ($).

a. Determine the equilibrium number of boars killed per season, when there is unlimited access to the park.
b. Determine the per boar fee that must be charged to reduce the harvest to the efficient level.
c. Determine the social cost of unlimited hunting of the boar.

Answer: ***a.***

The number of boars with unlimited access is determined by equating the marginal private costs to demand.

MPC = demand
$1 + 0.001Q = 10 - 0.008Q$
$Q = (10 - 1)/0.009 = 1{,}000$ boars/season

This corresponds to a private cost of

$P = 10 - 0.008(100) = 2.0$, that is $200 per boar.

b.

The user fee to limit the number of boars to the efficient level is determined where the marginal social cost intersects the demand curve.

MSC = demand
$1 + 0.0067Q = 10 - 0.008Q$
$Q = (10 - 1)/0.0147 = 612$ boars/season

The fee is $10 - 0.008(612) = 2.1$,
that is $210 per boar.

c.

The social cost of unlimited access to the park is the area between the MSC and demand between the two levels of Q. This is a triangle with base 388 (100 – 612). The height is the vertical distance above demand, at

Q = 1,000, to MSC, which is:
Height of MSC = $1 + 0.0067(1{,}000) = 7.70$
At Q = 1,000 the height of the demand curve is:
Height of demand = $10 - 0.008(1{,}000) = 2.00$

Thus, the height of the MSC above demand is 5.7 (7.70 – 2.00). Therefore, the area of the triangle is the social loss.

Social loss = $(1/2)(b)(h) = (1/2)(388)(5.70)$
$= 1{,}105.8$
= $100,580/season.

Diff: 2
Section: 18.5

94) Three individuals consume a public good, and their demands are expressed as:

$P_1 = 1.5 - 0.005Q$ (for $Q < 300$);

$P_2 = 4.5 - 0.007Q$ (for $Q < 643$);

$P_3 = 3.0 - 0.002Q$ (for $Q < 1500$),

where P represents price in dollars per unit and Q represents output in units per day. The marginal cost of providing the service is given as a constant $5.00 per unit. Determine the efficient level of output of this public good.

Answer: The efficient level occurs where the total demand curve intersects MC. The total demand is the vertical sum of the individual demands. The following curve applies for output up to Q = 300 only.

Demand $P = 9.0 - 0.014Q$. $(0 \leq Q \leq 300)$

The efficient output of the good is determined at the intersection of demand and MC.

$9.0 - 0.014Q = 5.00$

$Q = 285.7$ or 286 units per time period

For output rates above Q = 300, only the second and third demands apply, and for outputs above Q = 643, only the third demand applies.

Diff: 2
Section: 18.6

95) The European demand for access to satellite transmissions can be divided into three groups: A, B, and C. The demand curves for the three groups are:

$P_A = 500 - 2Q_A$ (for $Q < 250$)

$P_B = 300 - Q_B$ (for $Q < 300$)

$P_C = 400 - 2Q_C$ (for $Q < 200$),

where Q = number of hours access per month, and P = price per hour. Satellite transmission is a pure public good with zero marginal cost.

a. Explain the difference between horizontal and vertical summation of demand curves. Derive the horizontally and vertically summed demand curves. Explain the circumstances under which vertical summation is appropriate. When is horizontal summation appropriate?
b. Determine the efficient quantity of satellite service. Explain the process of finding the efficient quantity including a justification for the demand curve. What price is optimal?

Answer: ***a.***

Horizontal summation implies that the addition is taking place across quantities. Horizontal summation is appropriate when demands are competing. Competing demands imply the consumption by one individual detracts form the potential enjoyment of others.

Vertical assumption is appropriate when demands are non–competing so that consumption by one individual does not detract from the potential for others to enjoy the good. Non–competing demands imply zero marginal cost for additional users. Vertical summation implies that addition is across price.

Vertical summation

$P = P_A + P_B + P_C$

$P = [(500 - 2Q_A) + (300 - Q_B) + (400 - 2Q_C)]$

$P = 1{,}200 - 5Q$

To sum horizontally, we solve for Q (for $Q \leq 200$)

$P_A = 500 - 2Q_A$

$Q_A = 250 - 0.5P_A$

$P_B = 300 - Q_B$

$Q_B = 300 - P_B$

$P_C = 400 - 2Q_C$

$Q_C = 200 - 0.5P_C$

$Q = Q_A + Q_B + Q_C$

$Q = [(250 - 0.5P_A) + (300 - P_B) + (200 - 0.5P_C)]$

$Q = 750 - 2P$

b.

Since satellite transmission is a public good, the demands are non–competing. This suggests that a vertically summed demand curve is appropriate. Efficiency requires that P be set equal to MC, i.e., 0. This occurs where Q = 300, i.e., where prize for consumer B is equal to 0.

Diff: 2
Section: 18.6

96) The city of Econoville has 100 residents who each have the identical demand function for park area: $P = 10 - Q$. The marginal cost of providing parks is $MC(Q) = 10 + 10Q$. Park area is a public good. That is, if the city of Econoville provides park area, all of the residents can enjoy the area. If the city of Econoville does not offer public park area, how much area of parks will each individual resident maintain on their own? What is the optimal level of public parks in Econoville?

Answer: If the city does not provide park area, each resident will set their individual marginal benefit equal to the marginal cost of providing park area. This is:
$10 - Q = 10 + 10Q \Rightarrow Q = 0$. That is, people do not enjoy park area enough to maintain their own park. However, since park area is a public good and all individuals can enjoy park area (nonexcludability in consumption), the cities aggregate marginal benefit for park area is: $1{,}000 - 100Q = 10 + 10Q \Rightarrow Q = 9$. Each resident is willing to contribute \$1 for each unit of park area.

Diff: 1
Section: 18.6

97) The city of Econoville has 100 residents who each have the identical demand function for lake area: $P = 1{,}000 - 9.95Q$. The marginal cost of maintaining lake area is $MC(Q) = 1{,}500 + 5Q$. Lake area is a public good. That is, if the city of Econoville provides public access lake area, all of the residents can enjoy the area. If the city of Econoville does not offer public lake area, how much area of lakes will each individual resident maintain on their own? What is the optimal area of public lakes in Econoville? What flat lake tax should Econoville implement on residents for units of lake area the city provides? With this flat tax, what is the total contribution of each resident for the lake?

Answer: If the city does not provide lake area, each resident will set their individual marginal benefit equal to the marginal cost of providing lake area. This is:
$1{,}000 - 9.95Q = 1{,}500 + 5Q$

Therefore we have $Q = 0$. That is, people do not enjoy lake area enough to maintain their own lake. However, since lake area is a public good and all individuals can enjoy lake area (nonexcludability in consumption), the cities aggregate marginal benefit for lake area is: $100{,}000 - 995Q = 1{,}500 + 5Q \Rightarrow Q = \frac{98{,}500}{1{,}000} = 98.5$. Each resident is willing to contribute \$19.925 for each unit of lake area. This is the tax Econoville should set on each unit of lake area. Each resident contributes \$1,962.6125 for lake maintenance.

Diff: 1
Section: 18.6

98) The city of Econoville has 100 residents who each have the identical demand function for roads: $P = 100 - 1.99Q$. The marginal cost of providing road area is: $MC(Q) = 2{,}500 + Q$. Road area is a public good. That is, if the city of Econoville provides public access to roads, all of the residents can enjoy the roads. If the city of Econoville does not offer public roads, how much area of roads will each individual resident maintain on their own? What is the optimal area of public roads in Econoville? What flat road tax should Econoville implement on residents for units of roads the city provides? With this flat tax, what is the total contribution of each resident for the roads?

Answer: If the city does not provide roads, each resident will set their individual marginal benefit equal to the marginal cost of providing roads. This is: $100 - 1.99Q = 2{,}500 + Q$.

Therefore we have Q = 0. That is, people do not enjoy road area enough to maintain their own roads. However, since road area is a public good and all individuals can enjoy road area (nonexcludability in consumption), the cities aggregate marginal benefit for road area is:

$10{,}000 - 199Q = 2{,}500 + Q \Rightarrow Q = \frac{7{,}500}{200} = 37.5$. Each resident is willing to contribute

$25.375 for each unit of road area. This is the tax Econoville should set on each unit of road area. Each resident contributes $951.5625 for roads.

Diff: 1
Section: 18.6

99) The operation of large trucks in Econoville causes damages to public roads. The marginal external cost function of operating large trucks in Econoville is: $MEC(m) = 0.05m$, where m is the number of miles large trucks are driven in Econoville in thousands. The marginal benefit of large truck operation in Econoville is: $MB(m) = 1{,}000 - 2m$. How many miles do large trucks drive in Econoville if they are not forced to pay for damage to roads? If Econoville charges a fee for every thousand miles a large truck drives in Econoville, what is the optimal fee? If Econoville sets a standard for the quantity of miles large trucks drive in Econoville, what is the optimal standard? If the profitability of large truck operation in Econoville increases the marginal benefit function to: $MB(m) = 1{,}500 - 2m$ and Econoville is using a standard, is it optimal for Econoville to increase the standard?

Answer: If large truck operators are not forced to pay for damage to roads, their optimal choice of miles is given by: $MB(m) = 0 \Rightarrow 1{,}000 - 2m = 0 \Leftrightarrow m = 500$. The societal optimum number of miles corresponds to: $MB(m) = MEC(m) \Rightarrow 1{,}000 - 2m = 0.05m \Leftrightarrow m = 487.80$. The marginal external cost for this level of operation is: $24.39. This implies the optimal fee Econoville should charge for truck operation is $24.39 per thousand miles. If Econoville sets a standard, the standard should be set at 487,800 miles. If truck profitability increases, the new societal optimum for miles is given by: $MB(m) = MEC(m) \Rightarrow 1{,}500 - 2m = 0.05m \Leftrightarrow m = 731.71$. Econoville should raise the standard from 487,800 to 731,710 miles.

Diff: 2
Section: 18.6

100) Visitors to National Parks cause damage and increased maintenance costs on the parks. The marginal external cost of visitors is: $MEC(q) = 1.5q$, where q is the number of visitors to National Parks in thousands. The marginal benefit to visitors of attending National Parks is: $MB(q) = 75 - 0.5q$. If the Parks do not charge a fee, how many visitors will attend the National Parks. What is the optimal level of park visitation? If the National Parks were to establish a park visitation fee, what is the optimal level of the fee?

Answer: Without being forced to pay for the marginal external cost, park visitors will choose site visitations such that: $MB(q) = 75 - 0.5q = 0 \Rightarrow q = 150$. Thus, without a fee 150,000 visitors will attend the National Parks. The optimal level of park visitation takes into consideration the costs be imposed on the parks. Thus,
$MB(q) = 75 - 0.5q = 1.5q \Rightarrow q = 37.5$. For society, the optimal number of park visitors is 37,500.

Diff: 2
Section: 18.6

101) Mr. Barnes operates a power plant in the local market. Mr. Barnes' marginal cost function is: $MC(q) = 2 + 0.1q$. Mr. Barnes can sell all the output he produces for \$9 per unit. In generating power, Mr. Barnes also emits pollution that causes damage to the local community. The marginal external cost of his production is: $MEC(q) = 0.05q$. What level of output will Mr. Barnes choose to maximize profits? Is this level of production efficient? If not, what could the local community do to ensure efficiency?

Answer: To maximize profits, Mr. Barnes sets: $P = MC(q) \Rightarrow 9 = 2 + 0.1q \Leftrightarrow q = 70$. The efficient level of production corresponds to:
$P = MCS(q) = MC(q) + MEC(q) \Rightarrow 9 = 2 + 0.15q \Leftrightarrow q = 46\frac{2}{3}$. Since Mr. Barnes isn't forced to pay for his pollution damages, he overproduces power. To dissuade Mr. Barnes from overproducing, the local community could charge a pollution fee equal to his marginal external cost. In this case, the optimal fee is: $\$2\frac{1}{3}$ per unit of power. Alternatively, the local community could set a standard and only allow Mr. Barnes to produce $46\frac{2}{3}$ units of power.

Diff: 2
Section: 18.6

102) Mr. Barnes has a monopoly in the production of power in the local market. The demand for Mr. Barnes power is: $P = 100 - 0.25q \Rightarrow MR(q) = 100 - 0.5q$. Mr. Barnes marginal costs are constant at 5. In the generation of power, Mr. Barnes plant emits pollution that causes marginal external damages according to: $MEC(q) = 0.05q$. If the local government does nothing, how much will Mr. Barnes produce to maximize profits? What is the marginal social cost of his level of output? What price do consumers pay for each unit of Mr. Barnes' output? Is this level of production optimal? Should the local government institute a pollution fee? If so, what is the optimal fee?

Answer: Mr. Barnes maximizes profits by setting: $MR(q) = MC(q) \Rightarrow 100 - 0.5q = 5 \Leftrightarrow q = 190$. The marginal social cost of this output level is: $MCS(q = 190) = MC(q = 190) + MEC(q = 190) = 5 + 0.25\ (190) = 52.50$. Consumers pay \$52.50 for each unit of power. Since the marginal benefit for a unit of Mr. Barnes power is \$52.50 and the marginal social cost is also \$52.50, Mr. Barnes level of production is optimal for society. In this case, the government should not institute a pollution fee.

Diff: 2
Section: 18.6

103) Ms. Moneynickel has a monopoly in oil refinement in the local market. The demand for Ms. Moneynickel's oil is: $P = 65 - q$. The relevant marginal revenue function is: $MR(q) = 65 - 2q$. Ms. Moneynickel's marginal cost function is: $MC(q) = 8$. In the refinement of oil, Ms. Moneynickel emits pollution that has the marginal external cost function: $MEC(q) = 2$. What level of output will Ms. Moneynickel select to maximize profits? What is the marginal social cost of Ms. Moneynickel's profit maximizing output? What do consumers pay for Ms. Moneynickels refined oil? Is this level of output efficient? Should more or less oil be refined to reach the optimum output level? Should the local government charge Ms. Moneynickel a pollution fee for each unit of oil she refines?

Answer: Ms. Moneynickel's profit maximizing level of output corresponds to: $MR(q) = MC(q) \Rightarrow 65 - 2q = 8 \Leftrightarrow q = 28.5$. The marginal social cost of Ms. Moneynickel's output level is: $MSC(q) = MC(q) + MEC(q) = 8 + 2 = 10$. Consumers are paying \$36.50 per unit of oil refined. This implies that the marginal benefit exceeds the marginal social cost at Ms. Moneynickel's output level. Essentially, since Ms. Moneynickel's operates a monopoly, she is under polluting. To reach the societal optimum, Ms. Moneynickel must produce more oil. The local government should not charge a pollution fee or Ms. Moneynickel will produce less refined oil. If the local government placed a price ceiling of \$10 on oil, Ms. Moneynickel would produce the societal optimum level of oil.

Diff: 1
Section: 18.6

104) Ms. Moneynickel has a monopoly in oil refinement in the local market. The demand for Ms. Moneynickel's oil is: $P = 75 - q$. The relevant marginal revenue function is: $MR(q) = 75 - 2q$. Ms. Moneynickel's marginal cost function is: $MC(q) = 0.5q$. In the refinement of oil, Ms. Moneynickel emits pollution that has the marginal external cost function: $MEC(q) = 31$. What level of output will Ms. Moneynickel select to maximize profits? What is the marginal social cost of Ms. Moneynickel's profit maximizing output? What do consumers pay for Ms. Moneynickels refined oil? Is this level of output efficient? Should more or less oil be refined to reach the optimum output level? Should the local government charge Ms. Moneynickel a pollution fee for each unit of oil she refines?

Answer: Ms. Moneynickel's profit maximizing level of output corresponds to: $MR(q) = MC(q) \Rightarrow 75 - 2q = 0.5q \Leftrightarrow q = 30$. The marginal social cost of Ms. Moneynickel's output level is: $MSC(q) = MC(q) + MEC(q) = 15 + 31 = 46$. Consumers are paying \$45 per unit of oil refined. This implies that the marginal benefit is exceeded by the marginal social cost at Ms. Moneynickel's output level. To reach the societal optimum, Ms. Moneynickel must produce less oil. The optimal level of output corresponds to: $P = MSC(q) \Rightarrow 75 - q = 31 + 0.5q \Leftrightarrow q = 29\frac{1}{3}$.

If a pollution fee is charged to Ms. Moneynickel on each unit of pollution, her profit maximizing output becomes: $MR(q) = MC(q) + f \Rightarrow 75 - 2q = 0.5q + f \Leftrightarrow q = \frac{75 - f}{2.5}$. The local government should set the fee so that it is optimal for Ms. Moneynickel to produce 29 1/3 units of output. This implies: $q = 29\frac{1}{3} \Rightarrow \frac{75 - f}{2.5} = 29\frac{1}{3} \Leftrightarrow f = 1\frac{2}{3}$.

Diff: 3
Section: 18.6

105) The city of Econoville currently does not charge a fee to residents to use the city garbage services. The marginal social cost of garbage is: $MSC_d(g_d) = 23g_d$, where g_d is tons of garbage disposed per year. The marginal benefit function of garbage removed from residences is: $MB(g) = 1{,}000 - 2g$. Given the lack of a payment plan for garbage disposal, what level of garbage are the city residents disposing each year? Is this level of disposal efficient? Why or why not? Suppose the marginal cost of recycling is: $MSC_r(g_r) = 46g_r$. The marginal benefit of garbage removed from residences is: $MB(g_d, g_r) = 1{,}000 - 2(g_d + g_r)$. What is the optimal level of garbage disposed and garbage recycled in Econoville?

Answer: With the payment plan, residents set: $MB(g_d) = 0 \Rightarrow 1{,}000 - 2g_d = 0 \Leftrightarrow g_d = 500$. The marginal social cost of this level of garbage disposal is \$11,500. This level of disposal is not efficient because the marginal benefit is zero while the marginal cost society pays is \$11,500. The efficient level of disposal sets: $MB(g_d) = MSC_d(g_d) = 1{,}000 - 2g_d = 23g_d \Leftrightarrow g_d = 40$. With recycling as an option, the optimal levels require: $MB(g_d, g_r) = MSC_d(g_d) = MSC_r(g_r)$. Equal marginal social costs of disposal and recycling require: $23g_d = 46g_r \Leftrightarrow g_d = 2g_r$. This implies: $MB(g_d = 2g_r, g_r) = 1{,}000 - 2(3g_r) = 46g_r \Leftrightarrow g_r = 19.23$. Thus, optimal garbage disposal is 38.46 units.

Diff: 2
Section: 18.6

106) The city of Econoville currently charges a fee of \$0.50 to residents for each 50 gallon can of trash the city garbage service collects from their residence. The marginal social cost of garbage disposed is: $MSC_d\left(g_d\right) = 15.50$, where g_d is a 50 gallon drum of garbage disposed. The marginal benefit function of garbage removed from residences is: $MB\left(g\right) = 800 - 2g$. Given the payment plan for garbage disposal, what level of garbage are the city residents disposing each year? Is this level of disposal efficient? Why or why not? Suppose the marginal cost of recycling is: $MSC_r\left(g_r\right) = 2.50g_r$. The marginal benefit of garbage removed from residences is: $MB\left(g_d, g_r\right) = 800 - 2\left(g_d + g_r\right)$. What is the optimal level of garbage disposed and garbage recycled in Econoville?

Answer: With the payment plan, residents set: $MB\left(g_d\right) = 0.5 \Rightarrow 800 - 2g_d = 0.5 \Leftrightarrow g_d = 399.75$. The marginal social cost of this level of garbage disposal is \$15.50. This level of disposal is not efficient because the marginal benefit is \$0.50 while the marginal cost society pays is \$15.50. The efficient level of disposal sets: $MB\left(g_d\right) = MSC_d\left(g_d\right) = 800 - 2g_d = 15.50 \Leftrightarrow g_d = 392.25$. With recycling as an option, the optimal levels require: $MB\left(g_d, g_r\right) = MSC_d\left(g_d\right) = MSC_r\left(g_r\right)$. Equal marginal social costs of disposal and recycling require: $15.50 = 2.5g_r \Leftrightarrow g_r = 6.2$. This implies: $MB\left(g_d, g_r = 6.2\right) = 800 - 2\left(g_d + 6.2\right) = 15.50 \Leftrightarrow g_d = 386.05$. Thus, optimal garbage disposal is 386.05 units while optimal garbage recycled is 6.2 units.

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107) The city of Econoville currently charges a fee of \$0.50 to residents for each 50 gallon can of trash the city garbage service collects from their residence. A 50 gallon can of recyclable trash costs a resident \$3.50 to be collected. The marginal social cost of garbage disposed is: $MSC_d\left(g_d\right) = 12.50$ where g_d is a 50 gallon drum of garbage disposed. The marginal social cost of garbage recycled is: $MSC_r\left(g_r\right) = 2.50g_r$. The marginal benefit function of garbage removed from residences is: $MB\left(g_d, g_r\right) = 800 - 2\left(g_d + g_r\right)$. Given the payment plan for garbage disposal, what level of garbage are the city residents disposing each year? How much will each resident recycle with this payment plan? Is this level of disposal and recycling efficient? Why or why not? What is the optimal level of garbage disposed and garbage recycled in Econoville? How can Econoville encourage residents to dispose and recycle the optimal amounts of garbage?

Answer: With the payment plan, residents set: $MB\left(g_d, g_r = 0\right) = 0.5 \Rightarrow 800 - 2g_d = 0.5 \Leftrightarrow g_d = 399.75$. Residents do not recycle any garbage because the net benefit of disposal is always greater than the net benefit of recycling. The marginal social cost of this level of garbage disposal is \$12.50. This level of disposal is not efficient because the marginal benefit is \$0.50 while the marginal cost society pays is \$12.50. The efficient level of disposal and recycling requires: $MSC_d\left(g_d\right) = MSC_r\left(g_r\right) \Rightarrow 12.50 = 2.50g_r \Leftrightarrow g_r = 5$. The optimal choice of disposal requires: $MB\left(g_d, g_r\right) = 800 - 2\left(g_d + 5\right) = 12.50 \Rightarrow g_d = 388.75$. With the current payment plan, city residents are disposing too much and recycling too little. In order to bring about the optimal level of disposal and recycling, the city of Econoville could raise the cost per 50 gallon can of trash disposed to \$12.50. Then, a recycling fee plan that charges \$2.50 for the first can of recyclable garbage and rises \$2.50 for each subsequent can would be optimal.

Diff: 2
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108) Smog Corporation and Grimy Corporation emit pollution in their production processes. The local government has established a standard for the pollution levels of Smog Corporation and Grimy Corporation of 25,000 units of pollution. To ensure this level of pollution is achieved efficiently, the government sells permits to the corporations that entitle them to emit a unit of pollution. Smog Corporation has the following demand function for pollution emission permits: $\varepsilon_M = 15{,}000 - \frac{P}{5}$. Grimy Corporation's demand function for pollution emission permits is: $\varepsilon_G = 13{,}000 - \frac{2P}{5}$. What is the equilibrium price of pollution permits? If the government makes the standard more stringent and allows only 15,000 units of pollution, what happens to the equilibrium price of pollution permits?

Answer: Equilibrium in the permit market requires:

$25{,}000 = \varepsilon_M + \varepsilon_G \Rightarrow 25{,}000 = 28{,}000 - \frac{3P}{5} \Leftrightarrow P = 5{,}000$. If the government sells only 15,000 pollution permits, permit market equilibrium requires:

$15{,}000 = \varepsilon_M + \varepsilon_G \Rightarrow 15{,}000 = 28{,}000 - \frac{3P}{5} \Leftrightarrow P = 21{,}666\frac{2}{3}$. Reducing the pollution standard by 40% resulted in the price of pollution permits rising by 333 1/3%.

Diff: 1
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109) Smog Corporation and Grimy Corporation emit pollution in their production processes. The local government has established a standard for the pollution levels of Smog Corporation and Grimy Corporation of 25,000 units of pollution. To ensure this level of pollution, the government has allocated 15,000 pollution permits to Smog Corporation and 10,000 pollution permits to Grimy Corporation. Smog Corporation has the following demand function for pollution emission permits:

$\varepsilon_M = 15{,}000 - \frac{P}{5}$. Grimy Corporation's demand function for pollution emission permits is:

$\varepsilon_G = 13{,}000 - \frac{2P}{5}$. Is the government's allocation of pollution permits efficient? If the government allowed the corporations to trade permits, would the firms be motivated to trade? If so, what would be the efficient level of trading?

Answer: The current allocation of permits is not efficient. We may rearrange each firms demand function for pollution permits to determine their marginal benefit of emitting pollution. This implies Smog Corporations marginal benefit of polluting is:

$\varepsilon_M = 15{,}000 - \frac{P}{5} \Leftrightarrow MB\left(\varepsilon_M\right) = 75{,}000 - 5\varepsilon_M.$

Grimy Corporation's marginal benefit of polluting is:

$\varepsilon_G = 13{,}000 - \frac{2P}{5} \Leftrightarrow MB\left(\varepsilon_G\right) = 32{,}500 - \frac{5}{2}\varepsilon_G$. At the current pollution allocation, Smog Corporation's marginal benefit is: $MB\left(\varepsilon_M = 15{,}000\right) = 75{,}000 - 5(15{,}000) = 0$. However, Grimy corporation's marginal benefit is: $MB\left(\varepsilon_G = 10{,}000\right) = 32{,}500 - \frac{5}{2}(10{,}000) = 7{,}500.$

Since the marginal benefit of polluting is much higher to Grimy Corporation, the current allocation of pollution permits is not optimal. Grimy Corporation is willing to pay \$7,500 for a permit at the government's allocation while the marginal value of a permit to Smog Corporation is zero. Thus, there is a trade opportunity. If the government allowed the firms to trade the permits, the optimal allocation sets: $MB\left(\varepsilon_M\right) = MB\left(\varepsilon_G\right)$. Note that $25{,}000 = \varepsilon_M + \varepsilon_G \Leftrightarrow \varepsilon_G = 25{,}000 - \varepsilon_M$. So, the

$$MB\left(\varepsilon_M\right) = MB\left(\varepsilon_G = 25{,}000 - \varepsilon_M\right) \Rightarrow$$

efficient allocation requires:

$$75{,}000 - 5\varepsilon_M = 32{,}500 - \frac{5}{2}(25{,}000 - \varepsilon_M) \Leftrightarrow$$

$$\varepsilon_M = 14{,}000.$$

The efficient level of permits for Grimy Corporation is then 11,000. The marginal benefit of a permit for Smog Corporation if it uses 14,000 permits is \$5,000. Grimy Corporation is willing to pay \$5,000 per permit to purchase 1,000 permits from Smog Corporation. Both firms are better off and society has achieved the efficient allocation of pollution permits.

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