ch16

Student: _____

1. The duration of a bond is a function of the bond's

   A. coupon rate.
   B. yield to maturity.
   C. time to maturity.
   D. all of the above.
   E. none of the above.

2. Ceteris paribus, the duration of a bond is positively correlated with the bond's

   A. time to maturity.
   B. coupon rate.
   C. yield to maturity.
   D. all of the above.
   E. none of the above.

3. Ceteris paribus, the duration of a bond is negatively correlated with the bond's

   A. time to maturity.
   B. coupon rate.
   C. yield to maturity.
   D. B and C.
   E. none of the above.

4. Holding other factors constant, the interest-rate risk of a coupon bond is higher when the bond's:

   A. term-to-maturity is lower.
   B. coupon rate is higher.
   C. yield to maturity is lower.
   D. current yield is higher.
   E. none of the above.

5. Holding other factors constant, the interest-rate risk of a coupon bond is higher when the bond's:

   A. term-to-maturity is higher.
   B. coupon rate is higher.
   C. yield to maturity is higher.
   D. all of the above.
   E. none of the above.

6. Holding other factors constant, the interest-rate risk of a coupon bond is higher when the bond's:

   A. term-to-maturity is lower.
   B. coupon rate is lower.
   C. yield to maturity is higher.
   D. A and C
   E. none of the above.

7. Holding other factors constant, the interest-rate risk of a coupon bond is lower when the bond's:

   A. term-to-maturity is lower.
   B. coupon rate is higher.
   C. yield to maturity is lower.
   D. A and B.
   E. All of the above.

8. Holding other factors constant, the interest-rate risk of a coupon bond is lower when the bond's:

   A. term-to-maturity is lower.
   B. coupon rate is higher.
   C. yield to maturity is higher.
   D. A and B.
   E. All of the above.

9. Holding other factors constant, the interest-rate risk of a coupon bond is lower when the bond's:

   A. term-to-maturity is higher.
   B. coupon rate is lower.
   C. yield to maturity is higher.
   D. A and B.
   E. All of the above.

10. The "modified duration" used by practitioners is equal to the Macaulay duration

    A. times the change in interest rate.
    B. times (one plus the bond's yield to maturity).
    C. divided by (one minus the bond's yield to maturity).
    D. divided by (one plus the bond's yield to maturity).
    E. none of the above.

11. The "modified duration" used by practitioners is equal to _____ divided by (one plus the bond's yield to maturity).

    A. current yield
    B. the Macaulay duration
    C. yield to call.
    D. yield to maturity
    E. none of the above.

12. Given the time to maturity, the duration of a zero-coupon bond is higher when the discount rate is

    A. higher.
    B. lower.
    C. equal to the risk free rate.
    D. The bond's duration is independent of the discount rate.
    E. none of the above.

13. The interest-rate risk of a bond is

    A. the risk related to the possibility of bankruptcy of the bond's issuer.
    B. the risk that arises from the uncertainty of the bond's return caused by changes in interest rates.
    C. the unsystematic risk caused by factors unique in the bond.
    D. A and B above.
    E. A, B, and C above.

14. Which of the following two bonds is more price sensitive to changes in interest rates?
    1) A par value bond, X, with a 5-year-to-maturity and a 10% coupon rate.
    2) A zero-coupon bond, Y, with a 5-year-to-maturity and a 10% yield-to-maturity.

    A. Bond X because of the higher yield to maturity.
    B. Bond X because of the longer time to maturity.
    C. Bond Y because of the longer duration.
    D. Both have the same sensitivity because both have the same yield to maturity.
    E. None of the above

15. Holding other factors constant, which one of the following bonds has the smallest price volatility?

    A. 5-year, 0% coupon bond
    B. 5-year, 12% coupon bond
    C. 5 year, 14% coupon bond
    D. 5-year, 10% coupon bond
    E. Cannot tell from the information given.

16. Which of the following is **not** true?

    A. Holding other things constant, the duration of a bond increases with time to maturity.
    B. Given time to maturity, the duration of a zero-coupon decreases with yield to maturity.
    C. Given time to maturity and yield to maturity, the duration of a bond is higher when the coupon rate is lower.
    D. Duration is a better measure of price sensitivity to interest rate changes than is time to maturity.
    E. All of the above.

17. Which of the following is true?

    A. Holding other things constant, the duration of a bond decreases with time to maturity.
    B. Given time to maturity, the duration of a zero-coupon increases with yield to maturity.
    C. Given time to maturity and yield to maturity, the duration of a bond is higher when the coupon rate is lower.
    D. Duration is a better measure of price sensitivity to interest rate changes than is time to maturity.
    E. C and D.

18. The duration of a 5-year zero-coupon bond is

    A. smaller than 5.
    B. larger than 5.
    C. equal to 5.
    D. equal to that of a 5-year 10% coupon bond.
    E. none of the above.

19. The basic purpose of immunization is to

    A. eliminate default risk.
    B. produce a zero net interest-rate risk.
    C. offset price and reinvestment risk.
    D. A and B.
    E. B and C.

20. The duration of a par value bond with a coupon rate of 8% and a remaining time to maturity of 5 years is

    A. 5 years.
    B. 5.4 years.
    C. 4.17 years.
    D. 4.31 years.
    E. none of the above.

21. The duration of a perpetuity with a yield of 8% is

    A. 13.50 years.
    B. 12.11 years.
    C. 6.66 years.
    D. cannot be determined.
    E. none of the above.

22. A seven-year par value bond has a coupon rate of 9% and a modified duration of

    A. 7 years.
    B. 5.49 years.
    C. 5.03 years.
    D. 4.87 years.
    E. none of the above.

23. Par value bond XYZ has a modified duration of 6. Which one of the following statements regarding the bond is **true**?

    A. If the market yield increases by 1% the bond's price will decrease by $60.
    B. If the market yield increases by 1% the bond's price will increase by $50.
    C. If the market yield increases by 1% the bond's price will decrease by $50.
    D. If the market yield increases by 1% the bond's price will increase by $60.
    E. None of the above.

24. Which of the following bonds has the longest duration?

    A. An 8-year maturity, 0% coupon bond.
    B. An 8-year maturity, 5% coupon bond.
    C. A 10-year maturity, 5% coupon bond.
    D. A 10-year maturity, 0% coupon bond.
    E. Cannot tell from the information given.

25. Which one of the following par value 12% coupon bonds experiences a price change of $23 when the market yield changes by 50 basis points?

A. The bond with a duration of 6 years.
B. The bond with a duration of 5 years.
C. The bond with a duration of 2.7 years.
D. The bond with a duration of 5.15 years.
E. None of the above.

26. Which one of the following statements is **true** concerning the duration of a perpetuity?

A. The duration of 15% yield perpetuity that pays $100 annually is longer than that of a 15% yield perpetuity that pays $200 annually.
B. The duration of a 15% yield perpetuity that pays $100 annually is shorter than that of a 15% yield perpetuity that pays $200 annually.
C. The duration of a 15% yield perpetuity that pays $100 annually is equal to that of 15% yield perpetuity that pays $200 annually.
D. the duration of a perpetuity cannot be calculated.
E. None of the above.

27. Which one of the following statements is **false** concerning the duration of a perpetuity?

A. The duration of 15% yield perpetuity that pays $100 annually is longer than that of a 15% yield perpetuity that pays $200 annually.
B. The duration of a 15% yield perpetuity that pays $100 annually is shorter than that of a 15% yield perpetuity that pays $200 annually.
C. The duration of a 15% yield perpetuity that pays $100 annually is equal to that of 15% yield perpetuity that pays $200 annually.
D. A and B
E. All of the above.

28. The two components of interest-rate risk are

A. price risk and default risk.
B. reinvestment risk and systematic risk.
C. call risk and price risk.
D. price risk and reinvestment risk.
E. none of the above.

29. The duration of a coupon bond

A. does not change after the bond is issued.
B. can accurately predict the price change of the bond for any interest rate change.
C. will decrease as the yield to maturity decreases.
D. all of the above are true.
E. none of the above are true.

30. Indexing of bond portfolios is difficult because

A. the number of bonds included in the major indexes is so large that it would be difficult to purchase them in the proper proportions.
B. many bonds are thinly traded so it is difficult to purchase them at a fair market price.
C. the composition of bond indexes is constantly changing.
D. all of the above are true.
E. both A and B are true.

31. You have an obligation to pay $1,488 in four years and 2 months. In which bond would you invest your $1,000 to accumulate this amount, with relative certainty, even if the yield on the bond declines to 9.5% immediately after you purchase the bond?

A. a 6-year; 10% coupon par value bond
B. a 5-year; 10% coupon par value bond
C. a 5-year; zero-coupon bond
D. a 4-year; 10% coupon par value bond
E. none of the above

32. Duration measures

A. weighted average time until a bond's half-life.
B. weighted average time until cash flow payment.
C. the time required to recoup one's investment, assuming the bond was purchased for $1,000.
D. A and C.
E. B and C.

33. Duration

A. assesses the time element of bonds in terms of both coupon and term to maturity.
B. allows structuring a portfolio to avoid interest-rate risk.
C. is a direct comparison between bond issues with different levels of risk.
D. A and B.
E. A and C.

34. Identify the bond that has the longest duration (no calculations necessary).

A. 20-year maturity with an 8% coupon.
B. 20-year maturity with a 12% coupon.
C. 15-year maturity with a 0% coupon.
D. 10-year maturity with a 15% coupon.
E. 12-year maturity with a 12% coupon.

35. When interest rates decline, the duration of a 10-year bond selling at a premium

A. increases.
B. decreases.
C. remains the same.
D. increases at first, then declines.
E. decreases at first, then increases.

36. An 8%, 30-year corporate bond was recently being priced to yield 10%. The Macaulay duration for the bond is 10.20 years. Given this information, the bond's modified duration would be _____.

A. 8.05
B. 9.44
C. 9.27
D. 11.22
E. none of the above

37. An 8%, 15-year bond has a yield to maturity of 10% and duration of 8.05 years. If the market yield changes by 25 basis points, how much change will there be in the bond's price?

A. 1.85%
B. 2.01%
C. 3.27%
D. 6.44%
E. none of the above

38. One way that banks can reduce the duration of their asset portfolios is through the use of

A. fixed rate mortgages.
B. adjustable rate mortgages.
C. certificates of deposit.
D. short-term borrowing.
E. none of the above.

39. The duration of a bond normally increases with an increase in

A. term to maturity.
B. yield to maturity.
C. coupon rate.
D. all of the above.
E. none of the above.

40. Which one of the following is an **incorrect** statement concerning duration?

A. The higher the yield to maturity, the greater the duration
B. The higher the coupon, the shorter the duration.
C. The difference in duration is small between two bonds with different coupons each maturing in more than 15 years.
D. The duration is the same as term to maturity only in the case of zero-coupon bonds.
E. All of the statements are correct.

41. Which one of the following is a **correct** statement concerning duration?

A. The higher the yield to maturity, the greater the duration
B. The higher the coupon, the shorter the duration.
C. The difference in duration is small between two bonds with different coupons each maturing in more than 15 years.
D. The duration is the same as term to maturity only in the case of zero-coupon bonds.
E. B, C, and D

42. Immunization is not a strictly passive strategy because

A. it requires choosing an asset portfolio that matches an index.
B. there is likely to be a gap between the values of assets and liabilities in most portfolios.
C. it requires frequent rebalancing as maturities and interest rates change.
D. durations of assets and liabilities fall at the same rate.
E. none of the above.

43. Contingent immunization

A. is a mixed-active passive bond portfolio management strategy.
B. is a strategy whereby the portfolio may or may not be immunized.
C. is a strategy whereby if and when some trigger point value of the portfolio is reached, the portfolio is immunized to insure an minimum required return.
D. A and B.
E. A, B, and C.

44. Some of the problems with immunization are

A. duration assumes that the yield curve is flat.
B. duration assumes that if shifts in the yield curve occur, these shifts are parallel.
C. immunization is valid for one interest rate change only.
D. durations and horizon dates change by the same amounts with the passage of time.
E. A, B, and C.

45. If a bond portfolio manager believes

A. in market efficiency, he or she is likely to be a passive portfolio manager.
B. that he or she can accurately predict interest rate changes, he or she is likely to be an active portfolio manager.
C. that he or she can identify bond market anomalies, he or she is likely to be a passive portfolio manager.
D. A and B.
E. A, B, and C.

46. According to experts, most pension funds are underfunded because

A. their liabilities are of shorter duration than their assets.
B. their assets are of shorter duration than their liabilities.
C. they continually adjust the duration of their liabilities.
D. they continually adjust the duration of their assets.
E. they are too heavily invested in stocks.

47. Cash flow matching on a multiperiod basis is referred to as a

A. immunization.
B. contingent immunization.
C. dedication.
D. duration matching.
E. rebalancing.

48. Immunization through duration matching of assets and liabilities may be ineffective or inappropriate because

    A. conventional duration strategies assume a flat yield curve.
    B. duration matching can only immunize portfolios from parallel shifts in the yield curve.
    C. immunization only protects the nominal value of terminal liabilities and does not allow for inflation adjustment.
    D. both A and C are true.
    E. all of the above are true.

49. The curvature of the price-yield curve for a given bond is referred to as the bond's

    A. modified duration.
    B. immunization.
    C. sensitivity.
    D. convexity.
    E. tangency.

50. Consider a bond selling at par with modified duration of 10.6 years and convexity of 210. A 2 percent decrease in yield would cause the price to increase by 21.2%, according to the duration rule. What would be the percentage price change according to the duration-with-convexity rule?

    A. 21.2%
    B. 25.4%
    C. 17.0%
    D. 10.6%
    E. none of the above.

51. A **substitution swap** is an exchange of bonds undertaken to

    A. change the credit risk of a portfolio.
    B. extend the duration of a portfolio.
    C. reduce the duration of a portfolio.
    D. profit from apparent mispricing between two bonds.
    E. adjust for differences in the yield spread.

52. A **rate anticipation swap** is an exchange of bonds undertaken to

    A. shift portfolio duration in response to an anticipated change in interest rates.
    B. shift between corporate and government bonds when the yield spread is out of line with historical values.
    C. profit from apparent mispricing between two bonds.
    D. change the credit risk of the portfolio.
    E. increase return by shifting into higher yield bonds.

53. An analyst who selects a particular holding period and predicts the yield curve at the end of that holding period is engaging in

    A. a rate anticipation swap.
    B. immunization.
    C. horizon analysis.
    D. an intermarket spread swap.
    E. none of the above.

54. The process of unbundling and repackaging the cash flows from one or more bonds into new securities is called

A. speculation.
B. immunization.
C. reverse hedging.
D. interest rate arbitrage.
E. financial engineering.

55. An active investment strategy

A. implies that market prices are fairly set.
B. attempts to achieve returns greater than those commensurate with the risk borne.
C. attempts to achieve the proper return that is commensurate with the risk borne.
D. requires portfolio managers, while a passive investment strategy does not.
E. occurs when bond portfolio managers are hyperactive.

56. Interest-rate risk is important to

A. active bond portfolio managers.
B. passive bond portfolio managers.
C. both active and passive bond portfolio managers.
D. neither active nor passive bond portfolio managers.
E. obsessive bond portfolio managers.

57. Which of the following are **true** about the interest-rate sensitivity of bonds?
I) Bond prices and yields are inversely related.
II) Prices of long-term bonds tend to be more sensitive to interest rate changes than prices of short-term bonds.
III) Interest-rate risk is directly related to the bond's coupon rate.
IV) The sensitivity of a bond's price to a change in its yield to maturity is inversely related to the yield to maturity at which the bond is currently selling.

A. I and II
B. I and III
C. I, II, and IV
D. II, III, and IV
E. I, II, III, and IV

58. Which of the following are **false** about the interest-rate sensitivity of bonds?
I) Bond prices and yields are inversely related.
II) Prices of long-term bonds tend to be more sensitive to interest rate changes than prices of short-term bonds.
III) Interest-rate risk is directly related to the bond's coupon rate.
IV) The sensitivity of a bond's price to a change in its yield to maturity is inversely related to the yield to maturity at which the bond is currently selling.

A. I
B. III
C. I, II, and IV
D. II, III, and IV
E. I, II, III, and IV

59. Which of the following researchers have contributed significantly to bond portfolio management theory?
I) Sidney Homer
II) Harry Markowitz
III) Burton Malkiel
IV) Martin Liebowitz
V) Frederick Macaulay

A. I and II
B. III and V
C. III, IV, and V
D. I, III, IV, and V
E. I, II, III, IV, and V

60. According to the duration concept

A. only coupon payments matter.
B. only maturity value matters.
C. the coupon payments made prior to maturity make the effective maturity of the bond greater than its actual time to maturity.
D. the coupon payments made prior to maturity make the effective maturity of the bond less than its actual time to maturity.
E. discount rates don't matter.

61. Duration is important in bond portfolio management because
I) it can be used in immunization strategies.
II) it provides a gauge of the effective average maturity of the portfolio.
III) it is related to the interest rate sensitivity of the portfolio.
IV) it is a good predictor of interest rate changes.

A. I and II
B. I and III
C. III and IV
D. I, II, and III
E. I, II, III, and IV

62. Two bonds are selling at par value and each has 17 years to maturity. The first bond has a coupon rate of 6% and the second bond has a coupon rate of 13%. Which of the following is **true** about the durations of these bonds?

A. The duration of the higher-coupon bond will be higher.
B. The duration of the lower-coupon bond will be higher.
C. The duration of the higher-coupon bond will equal the duration of the lower-coupon bond.
D. There is no consistent statement that can be made about the durations of the bonds.
E. The bond's durations cannot be determined without knowing the prices of the bonds.

63. Two bonds are selling at par value and each has 17 years to maturity. The first bond has a coupon rate of 6% and the second bond has a coupon rate of 13%. Which of the following is **false** about the durations of these bonds?

A. The duration of the higher-coupon bond will be higher.
B. The duration of the lower-coupon bond will be higher.
C. The duration of the higher-coupon bond will equal the duration of the lower-coupon bond.
D. There is no consistent statement that can be made about the durations of the bonds.
E. A, C, and D

64. Which of the following offers a bond index?

A. Merrill Lynch
B. Salomon Smith Barney
C. Lehman
D. All of the above
E. All but Merrill Lynch

65. Which of the following two bonds is more price sensitive to changes in interest rates?
1) A par value bond, A, with a 12-year-to-maturity and a 12% coupon rate.
2) A zero-coupon bond, B, with a 12-year-to-maturity and a 12% yield-to-maturity.

A. Bond A because of the higher yield to maturity.
B. Bond A because of the longer time to maturity.
C. Bond B because of the longer duration.
D. Both have the same sensitivity because both have the same yield to maturity.
E. None of the above

66. Which of the following two bonds is more price sensitive to changes in interest rates?
1) A par value bond, D, with a 2-year-to-maturity and a 8% coupon rate.
2) A zero-coupon bond, E, with a 2-year-to-maturity and a 8% yield-to-maturity.

A. Bond D because of the higher yield to maturity.
B. Bond E because of the longer duration
C. Bond D because of the longer time to maturity.
D. Both have the same sensitivity because both have the same yield to maturity.
E. None of the above

67. Holding other factors constant, which one of the following bonds has the smallest price volatility?

A. 7-year, 0% coupon bond
B. 7-year, 12% coupon bond
C. 7 year, 14% coupon bond
D. 7-year, 10% coupon bond
E. Cannot tell from the information given.

68. Holding other factors constant, which one of the following bonds has the smallest price volatility?

A. 20-year, 0% coupon bond
B. 20-year, 6% coupon bond
C. 20 year, 7% coupon bond
D. 20-year, 9% coupon bond
E. Cannot tell from the information given.

69. The duration of a 15-year zero-coupon bond is

A. smaller than 15.
B. larger than 15.
C. equal to 15.
D. equal to that of a 15-year 10% coupon bond
E. none of the above.

70. The duration of a 20-year zero-coupon bond is

A. equal to smaller than 20.
B. larger than 20.
C. smaller than 20.
D. equal to that of a 20-year 10% coupon bond
E. none of the above.

71. The duration of a perpetuity with a yield of 10% is

A. 13.50 years.
B. 11 years.
C. 6.66 years.
D. cannot be determined.
E. none of the above.

72. The duration of a perpetuity with a yield of 6% is

A. 13.50 years.
B. 12.11 years.
C. 17.67 years.
D. cannot be determined.
E. none of the above.

73. Par value bond F has a modified duration of 9. Which one of the following statements regarding the bond is **true**?

A. If the market yield increases by 1% the bond's price will decrease by $90.
B. If the market yield increases by 1% the bond's price will increase by $90.
C. If the market yield increases by 1% the bond's price will decrease by $60.
D. If the market yield decreases by 1% the bond's price will increase by $60.
E. None of the above.

74. Par value bond GE has a modified duration of 11. Which one of the following statements regarding the bond is **true**?

A. If the market yield increases by 1% the bond's price will decrease by $55.
B. If the market yield increases by 1% the bond's price will increase by $55.
C. If the market yield increases by 1% the bond's price will decrease by $110.
D. If the market yield increases by 1% the bond's price will increase by $110.
E. None of the above.

75. Which of the following bonds has the longest duration?

A. A 15-year maturity, 0% coupon bond.
B. A 15-year maturity, 9% coupon bond.
C. A 20-year maturity, 9% coupon bond.
D. A 20-year maturity, 0% coupon bond.
E. Cannot tell from the information given.

76. Which of the following bonds has the longest duration?

A. A 12-year maturity, 0% coupon bond.
B. A 12-year maturity, 8% coupon bond.
C. A 4-year maturity, 8% coupon bond.
D. A 4-year maturity, 0% coupon bond.
E. Cannot tell from the information given.

77. A 10%, 30-year corporate bond was recently being priced to yield 12%. The Macaulay duration for the bond is 11.3 years. Given this information, the bond's modified duration would be

A. 8.05
B. 10.09
C. 9.27
D. 11.22
E. none of the above

78. A 6%, 30-year corporate bond was recently being priced to yield 8%. The Macaulay duration for the bond is 8.4 years. Given this information, the bond's modified duration would be

A. 8.05
B. 9.44
C. 9.27
D. 7.78
E. none of the above

79. A 9%, 16-year bond has a yield to maturity of 11% and duration of 9.25 years. If the market yield changes by 32 basis points, how much change will there be in the bond's price?

A. 1.85%
B. 2.01%
C. 2.67%
D. 6.44%
E. none of the above

80. A 7%, 14-year bond has a yield to maturity of 6% and duration of 7 years. If the market yield changes by 44 basis points, how much change will there be in the bond's price?

A. 1.85%
B. 2.91%
C. 3.27%
D. 6.44%
E. none of the above

81. Consider a bond selling at par with modified duration of 12 years and convexity of 265. A 1 percent decrease in yield would cause the price to increase by 12%, according to the duration rule. What would be the percentage price change according to the duration-with-convexity rule?

    A. 21.2%
    B. 25.4%
    C. 17.0%
    D. 13.3%
    E. none of the above.

82. Consider a bond selling at par with modified duration of 22-years and convexity of 415. A 2 percent decrease in yield would cause the price to increase by 44%, according to the duration rule. What would be the percentage price change according to the duration-with-convexity rule?

    A. 21.2%
    B. 25.4%
    C. 17.0%
    D. 52.3%
    E. none of the above.

83. The duration of a par value bond with a coupon rate of 6.5% and a remaining time to maturity of 4 years is

    A. 3.65 years.
    B. 3.45 years.
    C. 3.85 years.
    D. 4.00 years.
    E. none of the above.

84. The duration of a par value bond with a coupon rate of 7% and a remaining time to maturity of 3 years is

    A. 3 years.
    B. 2.71 years.
    C. 2.81 years.
    D. 2.91 years.
    E. none of the above.

85. The duration of a par value bond with a coupon rate of 8.7% and a remaining time to maturity of 6 years is

    A. 6.0 years.
    B. 5.1 years.
    C. 4.27 years.
    D. 3.95 years.
    E. none of the above.

86. Discuss duration. Include in your discussion what duration measures, how duration relates to maturity, what variables affect duration, and how duration is used as a portfolio management tool (include some of the problems associated with the use of duration as a portfolio management tool).

87. Discuss contingent immunization. Is this form of bond portfolio management strategy an active, passive, or combination of both, strategy?

88. Discuss rate anticipation swaps as a bond portfolio management strategy.

89. You manage a portfolio for Ms. Greenspan, who has instructed you to be sure her portfolio has a value of at least $350,000 at the end of six years. The current value of Ms. Greenspan's portfolio is $250,000. You can invest the money at a current interest rate of 8%. You have decided to use a contingent immunization strategy.
    - What amount would need to be invested today to achieve the goal, given the current interest rate?
    - Suppose that four years have passed and the interest rate is 9%. What is the trigger point for Angel's portfolio at this time? (That is, how low can the value of the portfolio be before you will be forced to immunize to be assured of achieving the minimum acceptable return?)
    - Illustrate the situation graphically.
    - If the portfolio's value after 4 years is $291,437 what should you do?

90. You have purchased a bond for $973.02. The bond has a coupon rate of 6.4%, pays interest annually, has a face value of $1,000, 4 years to maturity, and a yield to maturity of 7.2%. The bond's duration is 3.6481 years. You expect that interest rates will fall by .3% later today.
- Use the modified duration to find the approximate percentage change in the bond's price. Find the new price of the bond from this calculation.
- Use your calculator to do the regular present value calculations to find the bond's new price at its new yield to maturity.
- What is the amount of the difference between the two answers? Why are your answers different? Explain the reason in words and illustrate it graphically.

ch16 Key

1. The duration of a bond is a function of the bond's

A. coupon rate.
B. yield to maturity.
C. time to maturity.
D. all of the above.
E. none of the above.

Duration is calculated by discounting the bond's cash flows at the bond's yield to maturity and, except for zero-coupon bonds, is always less than time to maturity.

Bodie - Chapter 16 #1
Difficulty: Easy

2. Ceteris paribus, the duration of a bond is positively correlated with the bond's

A. time to maturity.
B. coupon rate.
C. yield to maturity.
D. all of the above.
E. none of the above.

Duration is negatively correlated with coupon rate and yield to maturity.

Bodie - Chapter 16 #2
Difficulty: Moderate

3. Ceteris paribus, the duration of a bond is negatively correlated with the bond's

A. time to maturity.
B. coupon rate.
C. yield to maturity.
D. B and C.
E. none of the above.

Duration is negatively correlated with coupon rate and yield to maturity.

Bodie - Chapter 16 #3
Difficulty: Moderate

4. Holding other factors constant, the interest-rate risk of a coupon bond is higher when the bond's:

A. term-to-maturity is lower.
B. coupon rate is higher.
C. yield to maturity is lower.
D. current yield is higher.
E. none of the above.

The longer the maturity, the greater the interest-rate risk. The lower the coupon rate, the greater the interest-rate risk. The lower the yield to maturity, the greater the interest-rate risk. These concepts are reflected in the duration rules; duration is a measure of bond price sensitivity to interest rate changes (interest-rate risk).

Bodie - Chapter 16 #4
Difficulty: Moderate

5. Holding other factors constant, the interest-rate risk of a coupon bond is higher when the bond's:

A. term-to-maturity is higher.
B. coupon rate is higher.
C. yield to maturity is higher.
D. all of the above.
E. none of the above.

The longer the maturity, the greater the interest-rate risk. The lower the coupon rate, the greater the interest-rate risk. The lower the yield to maturity, the greater the interest-rate risk. These concepts are reflected in the duration rules; duration is a measure of bond price sensitivity to interest rate changes (interest-rate risk).

Bodie - Chapter 16 #5
Difficulty: Moderate

6. Holding other factors constant, the interest-rate risk of a coupon bond is higher when the bond's:

A. term-to-maturity is lower.
B. coupon rate is lower.
C. yield to maturity is higher.
D. A and C
E. none of the above.

The longer the maturity, the greater the interest-rate risk. The lower the coupon rate, the greater the interest-rate risk. The lower the yield to maturity, the greater the interest-rate risk. These concepts are reflected in the duration rules; duration is a measure of bond price sensitivity to interest rate changes (interest-rate risk).

Bodie - Chapter 16 #6
Difficulty: Moderate

7. Holding other factors constant, the interest-rate risk of a coupon bond is lower when the bond's:

A. term-to-maturity is lower.
B. coupon rate is higher.
C. yield to maturity is lower.
D. A and B.
E. All of the above.

The longer the maturity, the greater the interest-rate risk. The lower the coupon rate, the greater the interest-rate risk. The lower the yield to maturity, the greater the interest-rate risk. These concepts are reflected in the duration rules; duration is a measure of bond price sensitivity to interest rate changes (interest-rate risk).

Bodie - Chapter 16 #7
Difficulty: Moderate

8. Holding other factors constant, the interest-rate risk of a coupon bond is lower when the bond's:

A. term-to-maturity is lower.
B. coupon rate is higher.
C. yield to maturity is higher.
D. A and B.
E. All of the above.

The longer the maturity, the greater the interest-rate risk. The lower the coupon rate, the greater the interest-rate risk. The lower the yield to maturity, the greater the interest-rate risk. These concepts are reflected in the duration rules; duration is a measure of bond price sensitivity to interest rate changes (interest-rate risk).

Bodie - Chapter 16 #8
Difficulty: Moderate

9. Holding other factors constant, the interest-rate risk of a coupon bond is lower when the bond's:

A. term-to-maturity is higher.
B. coupon rate is lower.
C. yield to maturity is higher.
D. A and B.
E. All of the above.

The longer the maturity, the greater the interest-rate risk. The lower the coupon rate, the greater the interest-rate risk. The lower the yield to maturity, the greater the interest-rate risk. These concepts are reflected in the duration rules; duration is a measure of bond price sensitivity to interest rate changes (interest-rate risk).

Bodie - Chapter 16 #9
Difficulty: Moderate

10. The "modified duration" used by practitioners is equal to the Macaulay duration

A. times the change in interest rate.
B. times (one plus the bond's yield to maturity).
C. divided by (one minus the bond's yield to maturity).
D. divided by (one plus the bond's yield to maturity).
E. none of the above.

$D^* = D/(1 + y)$

Bodie - Chapter 16 #10
Difficulty: Moderate

11. The "modified duration" used by practitioners is equal to _____ divided by (one plus the bond's yield to maturity).

A. current yield
B. the Macaulay duration
C. yield to call.
D. yield to maturity
E. none of the above.

$D^* = D/(1 + y)$

Bodie - Chapter 16 #11
Difficulty: Moderate

12. Given the time to maturity, the duration of a zero-coupon bond is higher when the discount rate is

A. higher.
B. lower.
C. equal to the risk free rate.
D. The bond's duration is independent of the discount rate.
E. none of the above.

The duration of a zero-coupon bond is equal to the maturity of the bond.

Bodie - Chapter 16 #12
Difficulty: Moderate

13. The interest-rate risk of a bond is

A. the risk related to the possibility of bankruptcy of the bond's issuer.
B. the risk that arises from the uncertainty of the bond's return caused by changes in interest rates.
C. the unsystematic risk caused by factors unique in the bond.
D. A and B above.
E. A, B, and C above.

Changing interest rates change the bond's return, both in terms of the price of the bond and the reinvestment of coupon payments.

Bodie - Chapter 16 #13
Difficulty: Moderate

14. Which of the following two bonds is more price sensitive to changes in interest rates?
1) A par value bond, X, with a 5-year-to-maturity and a 10% coupon rate.
2) A zero-coupon bond, Y, with a 5-year-to-maturity and a 10% yield-to-maturity.

A. Bond X because of the higher yield to maturity.
B. Bond X because of the longer time to maturity.
C. Bond Y because of the longer duration.
D. Both have the same sensitivity because both have the same yield to maturity.
E. None of the above

Duration is the best measure of bond price sensitivity; the longer the duration the higher the price sensitivity.

Bodie - Chapter 16 #14
Difficulty: Moderate

15. Holding other factors constant, which one of the following bonds has the smallest price volatility?

A. 5-year, 0% coupon bond
B. 5-year, 12% coupon bond
C. 5 year, 14% coupon bond
D. 5-year, 10% coupon bond
E. Cannot tell from the information given.

Duration (and thus price volatility) is lower when the coupon rates are higher.

Bodie - Chapter 16 #15
Difficulty: Moderate

16. Which of the following is **not** true?

A. Holding other things constant, the duration of a bond increases with time to maturity.
B. Given time to maturity, the duration of a zero-coupon decreases with yield to maturity.
C. Given time to maturity and yield to maturity, the duration of a bond is higher when the coupon rate is lower.
D. Duration is a better measure of price sensitivity to interest rate changes than is time to maturity.
E. All of the above.

The duration of a zero-coupon bond is equal to time to maturity, and is independent of yield to maturity.

Bodie - Chapter 16 #16
Difficulty: Moderate

17. Which of the following is true?

A. Holding other things constant, the duration of a bond decreases with time to maturity.
B. Given time to maturity, the duration of a zero-coupon increases with yield to maturity.
C. Given time to maturity and yield to maturity, the duration of a bond is higher when the coupon rate is lower.
D. Duration is a better measure of price sensitivity to interest rate changes than is time to maturity.
E. C and D.

The duration of a zero-coupon bond is equal to time to maturity, and is independent of yield to maturity.

Bodie - Chapter 16 #17
Difficulty: Moderate

18. The duration of a 5-year zero-coupon bond is

A. smaller than 5.
B. larger than 5.
C. equal to 5.
D. equal to that of a 5-year 10% coupon bond.
E. none of the above.

Duration of a zero-coupon bond equals the bond's maturity.

Bodie - Chapter 16 #18
Difficulty: Easy

19. The basic purpose of immunization is to

A. eliminate default risk.
B. produce a zero net interest-rate risk.
C. offset price and reinvestment risk.
D. A and B.
E. B and C.

When a portfolio is immunized, price risk and reinvestment risk exactly offset each other resulting in zero net interest-rate risk.

Bodie - Chapter 16 #19
Difficulty: Moderate

20. The duration of a par value bond with a coupon rate of 8% and a remaining time to maturity of 5 years is

A. 5 years.
B. 5.4 years.
C. 4.17 years.
D. 4.31 years.
E. none of the above.

Calculations are shown below.

Yr.	CF	PV of CF@08%	Weight * Yr.
1	$80	$80/1.08 = $74.07	0.0741 * 1 = 0.0741
2	$80	$80/$(1.08)^2$ = $68.59	0.0686 * 2 = 0.1372
3	$80	$80/$(1.08)^3$ = $63.51	0.0635 * 3 = 0.1905
4	$80	$80/$(1.08)^4$ = $58.80	0.0588 * 4 = 0.2352
5	$1,080	$1,080/$(1.08)^5$ = $735.03	0.7350 * 5 = 3.6750
Sum		$1000.00	4.3120 yrs. (duration)

Bodie - Chapter 16 #20
Difficulty: Moderate

21. The duration of a perpetuity with a yield of 8% is

A. 13.50 years.
B. 12.11 years.
C. 6.66 years.
D. cannot be determined.
E. none of the above.

D = 1.08/0.08 = 13.50 years.

Bodie - Chapter 16 #21
Difficulty: Easy

22. A seven-year par value bond has a coupon rate of 9% and a modified duration of

A. 7 years.
B. 5.49 years.
C. 5.03 years.
D. 4.87 years.
E. none of the above.

Calculations are shown below.

Yr.	CF	PV of CF@9%	Weight * Yr.
1	$90	$82.57	0.0826 X 1 = 0.0826
2	$90	$75.75	0.0758 X 2 = 0.1516
3	$90	$69.50	0.0695 X 3 = 0.2085
4	$90	$63.76	0.0638 X 4 = 0.2552
5	$90	$58.49	0.0585 X 5 = 0.2925
6	$90	$53.66	0.0537 X 6 = 0.3222
7	$1,090	$596.26	0.5963 X 7 = 4.1741
Sum		$1000.00	5.4867 years (duration)
modified duration = 5.4867 years/1.09 = 5.03 years.			

Bodie - Chapter 16 #22
Difficulty: Difficult

23. Par value bond XYZ has a modified duration of 6. Which one of the following statements regarding the bond is **true**?

A. If the market yield increases by 1% the bond's price will decrease by $60.
B. If the market yield increases by 1% the bond's price will increase by $50.
C. If the market yield increases by 1% the bond's price will decrease by $50.
D. If the market yield increases by 1% the bond's price will increase by $60.
E. None of the above.

$\Delta P/P = -D^*\Delta y$; -$60 = -6(0.01) X $1,000

Bodie - Chapter 16 #23
Difficulty: Moderate

24. Which of the following bonds has the longest duration?

A. An 8-year maturity, 0% coupon bond.
B. An 8-year maturity, 5% coupon bond.
C. A 10-year maturity, 5% coupon bond.
D. A 10-year maturity, 0% coupon bond.
E. Cannot tell from the information given.

The longer the maturity and the lower the coupon, the greater the duration

Bodie - Chapter 16 #24
Difficulty: Moderate

25. Which one of the following par value 12% coupon bonds experiences a price change of $23 when the market yield changes by 50 basis points?

A. The bond with a duration of 6 years.
B. The bond with a duration of 5 years.
C. The bond with a duration of 2.7 years.
D. The bond with a duration of 5.15 years.
E. None of the above.

DP/P = -D X [D(1+y) / (1+y)]; -.023 = -D X [.005 / 1.12]; D = 5.15.

Bodie - Chapter 16 #25
Difficulty: Difficult

26. Which one of the following statements is **true** concerning the duration of a perpetuity?

A. The duration of 15% yield perpetuity that pays $100 annually is longer than that of a 15% yield perpetuity that pays $200 annually.
B. The duration of a 15% yield perpetuity that pays $100 annually is shorter than that of a 15% yield perpetuity that pays $200 annually.
C. The duration of a 15% yield perpetuity that pays $100 annually is equal to that of 15% yield perpetuity that pays $200 annually.
D. the duration of a perpetuity cannot be calculated.
E. None of the above.

Duration of a perpetuity = (1 + y)/y; thus, the duration of a perpetuity is determined by the yield and is independent of the cash flow.

Bodie - Chapter 16 #26
Difficulty: Easy

27. Which one of the following statements is **false** concerning the duration of a perpetuity?

A. The duration of 15% yield perpetuity that pays $100 annually is longer than that of a 15% yield perpetuity that pays $200 annually.
B. The duration of a 15% yield perpetuity that pays $100 annually is shorter than that of a 15% yield perpetuity that pays $200 annually.
C. The duration of a 15% yield perpetuity that pays $100 annually is equal to that of 15% yield perpetuity that pays $200 annually.
D. A and B
E. All of the above.

Duration of a perpetuity = (1 + y)/y; thus, the duration of a perpetuity is determined by the yield and is independent of the cash flow.

Bodie - Chapter 16 #27
Difficulty: Easy

28. The two components of interest-rate risk are

A. price risk and default risk.
B. reinvestment risk and systematic risk.
C. call risk and price risk.
D. price risk and reinvestment risk.
E. none of the above.

Default, systematic, and call risks are not part of interest-rate risk. Only price and reinvestment risks are part of interest-rate risk.

Bodie - Chapter 16 #28
Difficulty: Easy

29. The duration of a coupon bond

A. does not change after the bond is issued.
B. can accurately predict the price change of the bond for any interest rate change.
C. will decrease as the yield to maturity decreases.
D. all of the above are true.
E. none of the above are true.

Duration changes as interest rates and time to maturity change, can only predict price changes accurately for small interest rate changes, and increases as the yield to maturity decreases.

Bodie - Chapter 16 #29
Difficulty: Easy

30. Indexing of bond portfolios is difficult because

A. the number of bonds included in the major indexes is so large that it would be difficult to purchase them in the proper proportions.
B. many bonds are thinly traded so it is difficult to purchase them at a fair market price.
C. the composition of bond indexes is constantly changing.
D. all of the above are true.
E. both A and B are true.

All of the above are true statements about bond indexes.

Bodie - Chapter 16 #30
Difficulty: Moderate

31. You have an obligation to pay $1,488 in four years and 2 months. In which bond would you invest your $1,000 to accumulate this amount, with relative certainty, even if the yield on the bond declines to 9.5% immediately after you purchase the bond?

A. a 6-year; 10% coupon par value bond
B. a 5-year; 10% coupon par value bond
C. a 5-year; zero-coupon bond
D. a 4-year; 10% coupon par value bond
E. none of the above

When duration = horizon date, one is immunized, or protected, against one interest rate change. The zero has D = 5. Since the other bonds have the same coupon and yield, solve for the closest value of T that gives D = 4.2 years. 4.2 = (1.10))/.10 - [(1.10) + T(.10 - .10)] / = 1.1; .68 (1.10) T - .68 + .68 = 1.1; .68 (1.10) T = 1.1; (1.10) T = 1.6176; T [ln (1.10)] = ln (1.6176); T = 5.05 years, so choose the 5-year 10% coupon bond.

Bodie - Chapter 16 #31
Difficulty: Difficult

32. Duration measures

A. weighted average time until a bond's half-life.
B. weighted average time until cash flow payment.
C. the time required to recoup one's investment, assuming the bond was purchased for $1,000.
D. A and C.
E. B and C.

B and C are true, as one receives coupon payments throughout the life of the bond (for coupon bonds); thus, duration is less than time to maturity (except for zeros).

Bodie - Chapter 16 #32
Difficulty: Moderate

33. Duration

A. assesses the time element of bonds in terms of both coupon and term to maturity.
B. allows structuring a portfolio to avoid interest-rate risk.
C. is a direct comparison between bond issues with different levels of risk.
D. A and B.
E. A and C.

Duration is a weighted average of when the cash flows of a bond are received; thus both coupon and time to maturity are considered. If the duration of the portfolio equals the investor's horizon date, the investor is protected against interest rate changes.

Bodie - Chapter 16 #33
Difficulty: Moderate

34. Identify the bond that has the longest duration (no calculations necessary).

A. 20-year maturity with an 8% coupon.
B. 20-year maturity with a 12% coupon.
C. 15-year maturity with a 0% coupon.
D. 10-year maturity with a 15% coupon.
E. 12-year maturity with a 12% coupon.

The lower the coupon, the longer the duration. The zero-coupon bond is the ultimate low coupon bond, and thus would have the longest duration.

Bodie - Chapter 16 #34
Difficulty: Moderate

35. When interest rates decline, the duration of a 10-year bond selling at a premium

A. increases.
B. decreases.
C. remains the same.
D. increases at first, then declines.
E. decreases at first, then increases.

The relationship between interest rates and duration is an inverse one.

Bodie - Chapter 16 #35
Difficulty: Moderate

36. An 8%, 30-year corporate bond was recently being priced to yield 10%. The Macaulay duration for the bond is 10.20 years. Given this information, the bond's modified duration would be _____.

A. 8.05
B. 9.44
C. 9.27
D. 11.22
E. none of the above

$D^* = D/(1 + y)$; $D^* = 10.2/(1.1) = 9.27$

Bodie - Chapter 16 #36
Difficulty: Easy

37. An 8%, 15-year bond has a yield to maturity of 10% and duration of 8.05 years. If the market yield changes by 25 basis points, how much change will there be in the bond's price?

A. 1.85%
B. 2.01%
C. 3.27%
D. 6.44%
E. none of the above

$\Delta P/P = (-8.05 \times 0.0025)/1.1 = 1.85\%$

Bodie - Chapter 16 #37
Difficulty: Moderate

38. One way that banks can reduce the duration of their asset portfolios is through the use of

A. fixed rate mortgages.
B. adjustable rate mortgages.
C. certificates of deposit.
D. short-term borrowing.
E. none of the above.

One of the gap management strategies practiced by banks is the issuance of adjustable rate mortgages, which reduce the interest rate sensitivity of their asset portfolios.

Bodie - Chapter 16 #38
Difficulty: Easy

39. The duration of a bond normally increases with an increase in

A. term to maturity.
B. yield to maturity.
C. coupon rate.
D. all of the above.
E. none of the above.

The relationship between duration and term to maturity is a direct one; the relationship between duration and yield to maturity and to coupon rate is negative.

Bodie - Chapter 16 #39
Difficulty: Moderate

40. Which one of the following is an **incorrect** statement concerning duration?

A. The higher the yield to maturity, the greater the duration
B. The higher the coupon, the shorter the duration.
C. The difference in duration is small between two bonds with different coupons each maturing in more than 15 years.
D. The duration is the same as term to maturity only in the case of zero-coupon bonds.
E. All of the statements are correct.

The relationship between duration and yield to maturity is an inverse one; as is the relationship between duration and coupon rate. The difference in the durations of longer-term bonds of varying coupons (high coupon vs. zero) is considerable. Duration equals term to maturity only with zeros.

Bodie - Chapter 16 #40
Difficulty: Moderate

41. Which one of the following is a **correct** statement concerning duration?

A. The higher the yield to maturity, the greater the duration
B. The higher the coupon, the shorter the duration.
C. The difference in duration is small between two bonds with different coupons each maturing in more than 15 years.
D. The duration is the same as term to maturity only in the case of zero-coupon bonds.
E. B, C, and D

The relationship between duration and yield to maturity is an inverse one; as is the relationship between duration and coupon rate. The difference in the durations of longer-term bonds of varying coupons (high coupon vs. zero) is considerable. Duration equals term to maturity only with zeros.

Bodie - Chapter 16 #41
Difficulty: Moderate

42. Immunization is not a strictly passive strategy because

A. it requires choosing an asset portfolio that matches an index.
B. there is likely to be a gap between the values of assets and liabilities in most portfolios.
C. it requires frequent rebalancing as maturities and interest rates change.
D. durations of assets and liabilities fall at the same rate.
E. none of the above.

As time passes the durations of assets and liabilities fall at different rates, requiring portfolio rebalancing. Further, every change in interest rates creates changes in the durations of portfolio assets and liabilities.

Bodie - Chapter 16 #42
Difficulty: Moderate

43. Contingent immunization

A. is a mixed-active passive bond portfolio management strategy.
B. is a strategy whereby the portfolio may or may not be immunized.
C. is a strategy whereby if and when some trigger point value of the portfolio is reached, the portfolio is immunized to insure an minimum required return.
D. A and B.
E. A, B, and C.

Contingent immunization insures a minimum average rate of return over time by immunizing the portfolio if and when the value of the portfolio reaches the trigger point required to insure that rate of return. Thus, the strategy is a combination active/passive strategy; but the portfolio will be immunized only if necessary.

Bodie - Chapter 16 #43
Difficulty: Easy

44. Some of the problems with immunization are

A. duration assumes that the yield curve is flat.
B. duration assumes that if shifts in the yield curve occur, these shifts are parallel.
C. immunization is valid for one interest rate change only.
D. durations and horizon dates change by the same amounts with the passage of time.
E. A, B, and C.

Durations and horizon dates change with the passage of time, but not by the same amounts.

Bodie - Chapter 16 #44
Difficulty: Moderate

45. If a bond portfolio manager believes

A. in market efficiency, he or she is likely to be a passive portfolio manager.
B. that he or she can accurately predict interest rate changes, he or she is likely to be an active portfolio manager.
C. that he or she can identify bond market anomalies, he or she is likely to be a passive portfolio manager.
D. A and B.
E. A, B, and C.

If one believes that one can predict bond market anomalies, one is likely to be an active portfolio manager.

Bodie - Chapter 16 #45
Difficulty: Moderate

46. According to experts, most pension funds are underfunded because

A. their liabilities are of shorter duration than their assets.
B. their assets are of shorter duration than their liabilities.
C. they continually adjust the duration of their liabilities.
D. they continually adjust the duration of their assets.
E. they are too heavily invested in stocks.

According to experts, most pension funds are underfunded because their assets are of shorter duration than their liabilities.

Bodie - Chapter 16 #46
Difficulty: Moderate

47. Cash flow matching on a multiperiod basis is referred to as a

A. immunization.
B. contingent immunization.
C. dedication.
D. duration matching.
E. rebalancing.

Cash flow matching on a multiperiod basis is referred to as a dedication strategy.

Bodie - Chapter 16 #47
Difficulty: Easy

48. Immunization through duration matching of assets and liabilities may be ineffective or inappropriate because

A. conventional duration strategies assume a flat yield curve.
B. duration matching can only immunize portfolios from parallel shifts in the yield curve.
C. immunization only protects the nominal value of terminal liabilities and does not allow for inflation adjustment.
D. both A and C are true.
E. all of the above are true.

All of the above are correct statements about the limitations of immunization through duration matching.

Bodie - Chapter 16 #48
Difficulty: Easy

49. The curvature of the price-yield curve for a given bond is referred to as the bond's

A. modified duration.
B. immunization.
C. sensitivity.
D. convexity.
E. tangency.

Convexity measures the rate of change of the slope of the price-yield curve, expressed as a fraction of the bond's price.

Bodie - Chapter 16 #49
Difficulty: Easy

50. Consider a bond selling at par with modified duration of 10.6 years and convexity of 210. A 2 percent decrease in yield would cause the price to increase by 21.2%, according to the duration rule. What would be the percentage price change according to the duration-with-convexity rule?

A. 21.2%
B. 25.4%
C. 17.0%
D. 10.6%
E. none of the above.

$\Delta P/P = -D^*\Delta y + (1/2) * \text{Convexity} * (\Delta y)^2$; $= -10.6 * -.02 + (1/2) * 210 * (.02)^2 = .212 + .042 = .254$ (25.4%)

Bodie - Chapter 16 #50
Difficulty: Difficult

51. A **substitution swap** is an exchange of bonds undertaken to

A. change the credit risk of a portfolio.
B. extend the duration of a portfolio.
C. reduce the duration of a portfolio.
D. profit from apparent mispricing between two bonds.
E. adjust for differences in the yield spread.

A substitution swap is an example of bond price arbitrage, undertaken when the portfolio manager attempts to profit from apparent mispricing.

Bodie - Chapter 16 #51
Difficulty: Moderate

52. A **rate anticipation swap** is an exchange of bonds undertaken to

A. shift portfolio duration in response to an anticipated change in interest rates.
B. shift between corporate and government bonds when the yield spread is out of line with historical values.
C. profit from apparent mispricing between two bonds.
D. change the credit risk of the portfolio.
E. increase return by shifting into higher yield bonds.

A rate anticipation swap is pegged to interest rate forecasting, and involves increasing duration when rates are expected to fall and vice-versa.

Bodie - Chapter 16 #52
Difficulty: Moderate

53. An analyst who selects a particular holding period and predicts the yield curve at the end of that holding period is engaging in

A. a rate anticipation swap.
B. immunization.
C. horizon analysis.
D. an intermarket spread swap.
E. none of the above.

Horizon analysis involves selecting a particular holding period and predicting the yield curve at the end of that holding period. The holding period return for the bond can then be predicted.

Bodie - Chapter 16 #53
Difficulty: Easy

54. The process of unbundling and repackaging the cash flows from one or more bonds into new securities is called

A. speculation.
B. immunization.
C. reverse hedging.
D. interest rate arbitrage.
E. financial engineering.

The process of financial engineering in the bond market creates derivative securities with different durations and interest rate sensitivities.

Bodie - Chapter 16 #54
Difficulty: Easy

55. An active investment strategy

A. implies that market prices are fairly set.
B. attempts to achieve returns greater than those commensurate with the risk borne.
C. attempts to achieve the proper return that is commensurate with the risk borne.
D. requires portfolio managers, while a passive investment strategy does not.
E. occurs when bond portfolio managers are hyperactive.

An active strategy implies that there are mispricings in the markets, which can be exploited to earn superior returns.

Bodie - Chapter 16 #55
Difficulty: Easy

56. Interest-rate risk is important to

A. active bond portfolio managers.
B. passive bond portfolio managers.
C. both active and passive bond portfolio managers.
D. neither active nor passive bond portfolio managers.
E. obsessive bond portfolio managers.

Active managers try to identify interest rate trends so they can move in the right direction before the changes. Passive managers try to minimize interest-rate risk by offsetting it with price changes in strategies such as immunization.

Bodie - Chapter 16 #56
Difficulty: Easy

57. Which of the following are **true** about the interest-rate sensitivity of bonds?
I) Bond prices and yields are inversely related.
II) Prices of long-term bonds tend to be more sensitive to interest rate changes than prices of short-term bonds.
III) Interest-rate risk is directly related to the bond's coupon rate.
IV) The sensitivity of a bond's price to a change in its yield to maturity is inversely related to the yield to maturity at which the bond is currently selling.

A. I and II
B. I and III
C. I, II, and IV
D. II, III, and IV
E. I, II, III, and IV

Number III is incorrect because interest-rate risk is inversely related to the bond's coupon rate.

Bodie - Chapter 16 #57
Difficulty: Moderate

58. Which of the following are **false** about the interest-rate sensitivity of bonds?
I) Bond prices and yields are inversely related.
II) Prices of long-term bonds tend to be more sensitive to interest rate changes than prices of short-term bonds.
III) Interest-rate risk is directly related to the bond's coupon rate.
IV) The sensitivity of a bond's price to a change in its yield to maturity is inversely related to the yield to maturity at which the bond is currently selling.

A. I
B. III
C. I, II, and IV
D. II, III, and IV
E. I, II, III, and IV

Number III is incorrect because interest-rate risk is inversely related to the bond's coupon rate.

Bodie - Chapter 16 #58
Difficulty: Moderate

59. Which of the following researchers have contributed significantly to bond portfolio management theory?
I) Sidney Homer
II) Harry Markowitz
III) Burton Malkiel
IV) Martin Liebowitz
V) Frederick Macaulay

A. I and II
B. III and V
C. III, IV, and V
D. I, III, IV, and V
E. I, II, III, IV, and V

Harry Markowitz developed the mean-variance criterion but not a theory of bond portfolio management.

Bodie - Chapter 16 #59
Difficulty: Moderate

60. According to the duration concept

A. only coupon payments matter.
B. only maturity value matters.
C. the coupon payments made prior to maturity make the effective maturity of the bond greater than its actual time to maturity.
D. the coupon payments made prior to maturity make the effective maturity of the bond less than its actual time to maturity.
E. discount rates don't matter.

Duration considers that some of the cash flows are received prior to maturity and this effectively makes the maturity less than the actual time to maturity.

Bodie - Chapter 16 #60
Difficulty: Easy

61. Duration is important in bond portfolio management because
I) it can be used in immunization strategies.
II) it provides a gauge of the effective average maturity of the portfolio.
III) it is related to the interest rate sensitivity of the portfolio.
IV) it is a good predictor of interest rate changes.

A. I and II
B. I and III
C. III and IV
D. I, II, and III
E. I, II, III, and IV

Duration can be used to calculate the approximate effect of interest rate changes on prices, but is not used to forecast interest rates.

Bodie - Chapter 16 #61
Difficulty: Moderate

62. Two bonds are selling at par value and each has 17 years to maturity. The first bond has a coupon rate of 6% and the second bond has a coupon rate of 13%. Which of the following is **true** about the durations of these bonds?

A. The duration of the higher-coupon bond will be higher.
B. The duration of the lower-coupon bond will be higher.
C. The duration of the higher-coupon bond will equal the duration of the lower-coupon bond.
D. There is no consistent statement that can be made about the durations of the bonds.
E. The bond's durations cannot be determined without knowing the prices of the bonds.

In general, duration is negatively related to coupon rate. The greater the cash flows from coupon interest, the lower the duration will be. Since the bonds have the same time to maturity, that isn't a factor. The duration of the 6% coupon bond equals $(1.06/.06) * (1 - (1/1.06^{17})) = 11.10$. The duration of the 13% coupon bond equals $(1.13/.13) * (1 - (1/1.13^{17})) = 7.60$.

Bodie - Chapter 16 #62
Difficulty: Difficult

63. Two bonds are selling at par value and each has 17 years to maturity. The first bond has a coupon rate of 6% and the second bond has a coupon rate of 13%. Which of the following is **false** about the durations of these bonds?

A. The duration of the higher-coupon bond will be higher.
B. The duration of the lower-coupon bond will be higher.
C. The duration of the higher-coupon bond will equal the duration of the lower-coupon bond.
D. There is no consistent statement that can be made about the durations of the bonds.
E. A, C, and D

In general, duration is negatively related to coupon rate. The greater the cash flows from coupon interest, the lower the duration will be. Since the bonds have the same time to maturity, that isn't a factor. The duration of the 6% coupon bond equals $(1.06/.06) * (1 - (1/1.06^{17})) = 11.10$. The duration of the 13% coupon bond equals $(1.13/.13) * (1 - (1/1.13^{17})) = 7.60$.

Bodie - Chapter 16 #63
Difficulty: Difficult

64. Which of the following offers a bond index?

A. Merrill Lynch
B. Salomon Smith Barney
C. Lehman
D. All of the above
E. All but Merrill Lynch

All of these are mentioned in the text's discussion of bond indexes.

Bodie - Chapter 16 #64
Difficulty: Easy

65. Which of the following two bonds is more price sensitive to changes in interest rates?
1) A par value bond, A, with a 12-year-to-maturity and a 12% coupon rate.
2) A zero-coupon bond, B, with a 12-year-to-maturity and a 12% yield-to-maturity.

A. Bond A because of the higher yield to maturity.
B. Bond A because of the longer time to maturity.
C. Bond B because of the longer duration.
D. Both have the same sensitivity because both have the same yield to maturity.
E. None of the above

Duration is the best measure of bond price sensitivity; the longer the duration the higher the price sensitivity.

Bodie - Chapter 16 #65
Difficulty: Moderate

66. Which of the following two bonds is more price sensitive to changes in interest rates?
1) A par value bond, D, with a 2-year-to-maturity and a 8% coupon rate.
2) A zero-coupon bond, E, with a 2-year-to-maturity and a 8% yield-to-maturity.

A. Bond D because of the higher yield to maturity.
B. Bond E because of the longer duration
C. Bond D because of the longer time to maturity.
D. Both have the same sensitivity because both have the same yield to maturity.
E. None of the above

Duration is the best measure of bond price sensitivity; the longer the duration the higher the price sensitivity.

Bodie - Chapter 16 #66
Difficulty: Moderate

67. Holding other factors constant, which one of the following bonds has the smallest price volatility?

A. 7-year, 0% coupon bond
B. 7-year, 12% coupon bond
C. 7 year, 14% coupon bond
D. 7-year, 10% coupon bond
E. Cannot tell from the information given.

Duration (and thus price volatility) is lower when the coupon rates are higher.

Bodie - Chapter 16 #67
Difficulty: Moderate

68. Holding other factors constant, which one of the following bonds has the smallest price volatility?

A. 20-year, 0% coupon bond
B. 20-year, 6% coupon bond
C. 20 year, 7% coupon bond
D. 20-year, 9% coupon bond
E. Cannot tell from the information given.

Duration (and thus price volatility) is lower when the coupon rates are higher.

Bodie - Chapter 16 #68
Difficulty: Moderate

69. The duration of a 15-year zero-coupon bond is

A. smaller than 15.
B. larger than 15.
C. equal to 15.
D. equal to that of a 15-year 10% coupon bond
E. none of the above.

Duration of a zero-coupon bonds equals the bond's maturity.

Bodie - Chapter 16 #69
Difficulty: Easy

70. The duration of a 20-year zero-coupon bond is

A. equal to smaller than 20.
B. larger than 20.
C. smaller than 20.
D. equal to that of a 20-year 10% coupon bond
E. none of the above.

Duration of a zero-coupon bonds equals the bond's maturity.

Bodie - Chapter 16 #70
Difficulty: Easy

71. The duration of a perpetuity with a yield of 10% is

A. 13.50 years.
B. 11 years.
C. 6.66 years.
D. cannot be determined.
E. none of the above.

D = 1.10/0.10 = 11 years.

Bodie - Chapter 16 #71
Difficulty: Easy

72. The duration of a perpetuity with a yield of 6% is

A. 13.50 years.
B. 12.11 years.
C. 17.67 years.
D. cannot be determined.
E. none of the above.

D = 1.06/0.06 = 17.67 years.

Bodie - Chapter 16 #72
Difficulty: Easy

73. Par value bond F has a modified duration of 9. Which one of the following statements regarding the bond is **true**?

A. If the market yield increases by 1% the bond's price will decrease by $90.
B. If the market yield increases by 1% the bond's price will increase by $90.
C. If the market yield increases by 1% the bond's price will decrease by $60.
D. If the market yield decreases by 1% the bond's price will increase by $60.
E. None of the above.

$\Delta P/P = -D^*\Delta y$; -$90 = -9(0.01) X $1,000

Bodie - Chapter 16 #73
Difficulty: Moderate

74. Par value bond GE has a modified duration of 11. Which one of the following statements regarding the bond is **true**?

A. If the market yield increases by 1% the bond's price will decrease by $55.
B. If the market yield increases by 1% the bond's price will increase by $55.
C. If the market yield increases by 1% the bond's price will decrease by $110.
D. If the market yield increases by 1% the bond's price will increase by $110.
E. None of the above.

$\Delta P/P = -D^*\Delta y$; -$110 = -11(0.01) X $1,000

Bodie - Chapter 16 #74
Difficulty: Moderate

75. Which of the following bonds has the longest duration?

A. A 15-year maturity, 0% coupon bond.
B. A 15-year maturity, 9% coupon bond.
C. A 20-year maturity, 9% coupon bond.
D. A 20-year maturity, 0% coupon bond.
E. Cannot tell from the information given.

The longer the maturity and the lower the coupon, the greater the duration

Bodie - Chapter 16 #75
Difficulty: Moderate

76. Which of the following bonds has the longest duration?

A. A 12-year maturity, 0% coupon bond.
B. A 12-year maturity, 8% coupon bond.
C. A 4-year maturity, 8% coupon bond.
D. A 4-year maturity, 0% coupon bond.
E. Cannot tell from the information given.

The longer the maturity and the lower the coupon, the greater the duration

Bodie - Chapter 16 #76
Difficulty: Moderate

77. A 10%, 30-year corporate bond was recently being priced to yield 12%. The Macaulay duration for the bond is 11.3 years. Given this information, the bond's modified duration would be

A. 8.05
B. 10.09
C. 9.27
D. 11.22
E. none of the above

D* = D/(1 + y); D* = 11.3/(1.12) = 10.09

Bodie - Chapter 16 #77
Difficulty: Easy

78. A 6%, 30-year corporate bond was recently being priced to yield 8%. The Macaulay duration for the bond is 8.4 years. Given this information, the bond's modified duration would be

A. 8.05
B. 9.44
C. 9.27
D. 7.78
E. none of the above

D* = D/(1 + y); D* = 8.4/(1.08) = 7.78

Bodie - Chapter 16 #78
Difficulty: Easy

79. A 9%, 16-year bond has a yield to maturity of 11% and duration of 9.25 years. If the market yield changes by 32 basis points, how much change will there be in the bond's price?

A. 1.85%
B. 2.01%
C. 2.67%
D. 6.44%
E. none of the above

$\Delta P/P = (-9.25 \times 0.0032)/1.11 = 2.67\%$

Bodie - Chapter 16 #79
Difficulty: Moderate

80. A 7%, 14-year bond has a yield to maturity of 6% and duration of 7 years. If the market yield changes by 44 basis points, how much change will there be in the bond's price?

A. 1.85%
B. 2.91%
C. 3.27%
D. 6.44%
E. none of the above

$\Delta P/P = (-7 \times 0.0044)/1.06 = 2.91\%$

Bodie - Chapter 16 #80
Difficulty: Moderate

81. Consider a bond selling at par with modified duration of 12 years and convexity of 265. A 1 percent decrease in yield would cause the price to increase by 12%, according to the duration rule. What would be the percentage price change according to the duration-with-convexity rule?

A. 21.2%
B. 25.4%
C. 17.0%
D. 13.3%
E. none of the above.

$\Delta P/P = -D^*\Delta y + (1/2) * \text{Convexity} * (\Delta y)^2$; $= -12 * -.01 + (1/2) * 265 * (.01)^2 = .12 + .01325 = .13325$ or (13.3%)

Bodie - Chapter 16 #81
Difficulty: Difficult

82. Consider a bond selling at par with modified duration of 22-years and convexity of 415. A 2 percent decrease in yield would cause the price to increase by 44%, according to the duration rule. What would be the percentage price change according to the duration-with-convexity rule?

A. 21.2%
B. 25.4%
C. 17.0%
D. 52.3%
E. none of the above.

$\Delta P/P = -D^*\Delta y + (1/2) * \text{Convexity} * (\Delta y)^2$; $= -22 * -.02 + (1/2) * 415 * (.02)^2 = .44 + .083 = .523$ or (52.3%)

Bodie - Chapter 16 #82
Difficulty: Difficult

83. The duration of a par value bond with a coupon rate of 6.5% and a remaining time to maturity of 4 years is

A. 3.65 years.
B. 3.45 years.
C. 3.85 years.
D. 4.00 years.
E. none of the above.

Calculations are shown below.

Yr.	CF	PV of CF@6.5%	Weight * Yr.
1	$65	$65/1.065 = $61.03	0.0610 * 1 = 0.0610
2	$65	$65/$(1.065)^2$ = $57.31	0.0573 * 2 = 0.1146
3	$65	$65/$(1.065)^3$ = $53.81	0.0538 * 3 = 0.1614
4	$1,065	$1,065/$(1.065)^4$ = $827.85	0.8279 * 4 = 3.3116
Sum		$1000.00	3.6486 yrs. (duration)

Bodie - Chapter 16 #83
Difficulty: Moderate

84. The duration of a par value bond with a coupon rate of 7% and a remaining time to maturity of 3 years is

A. 3 years.
B. 2.71 years.
C. 2.81 years.
D. 2.91 years.
E. none of the above.

Calculations are shown below.

Yr.	CF	PV of CF@7%	Weight * Yr.
1	$70	$70/1.07 = $65.42	0.0654 * 1 = 0.0654
2	$70	$70/$(1.07)^2$ = $61.14	0.0611 * 2 = 0.1222
3	$1,070	$1,070/$(1.07)^3$ = $873.44	0.8734 * 3 = 2.6202
Sum		$1000.00	2.8078 yrs. (duration)

Bodie - Chapter 16 #84
Difficulty: Moderate

85. The duration of a par value bond with a coupon rate of 8.7% and a remaining time to maturity of 6 years is

A. 6.0 years.
B. 5.1 years.
C. 4.27 years.
D. 3.95 years.
E. none of the above.

Calculations are shown below.

Yr.	CF	PV of CF@8.7%	Weight * Yr.
1	$87	$87/1.087 = $80.04	0.0804 * 1 = 0.0804
2	$87	$87/$(1.087)^2$ = $73.63	0.0736 * 2 = 0.1472
3	$87	$87/$(1.087)^3$ = $67.74	0.0677 * 3 = 0.2031
4	$87	$87/$(1.087)^4$ = $62.32	0.0623 * 4 = 0.2492
5	$87	$87/$(1.087)^5$ = $57.33	0.0573 * 5 = 0.2865
6	1,087	1,087/$(1.087)^6$ = $658.95	0.6590 * 6 = 3.9540
Sum		$1000.00	3.9540 yrs. (duration)

Bodie - Chapter 16 #85
Difficulty: Moderate

86. Discuss duration. Include in your discussion what duration measures, how duration relates to maturity, what variables affect duration, and how duration is used as a portfolio management tool (include some of the problems associated with the use of duration as a portfolio management tool).

Duration is a measure of the time it takes to recoup one's investment in a bond, assuming that one purchased the bond for $1,000. Duration is shorter than term to maturity on coupon bonds as cash flows are received prior to maturity. Duration equals term to maturity for zero-coupon bonds, as no cash flows are received prior to maturity. Duration measures the price sensitivity of a bond with respect interest rate changes. The longer the maturity of the bond, the lower the coupon rate of the bond, and the higher the yield to maturity of the bond, the greater the duration. Interest-rate risk consists of two components: price risk and reinvestment risk. These two risk components move in opposite direction; if duration equals horizon date, the two types of risk exactly offset each other, resulting in zero net interest-rate risk. This portfolio management strategy is immunization. Some of the problems associated with this strategy are: the portfolio is protected against one interest rate change only; thus, once interest rates change, the portfolio must be rebalanced to maintain immunization; duration assumes a horizontal yield curve (not the shape most commonly observed); duration also assumes that any shifts in the yield curve are parallel (resulting in a continued horizontal yield curve); in addition, the portfolio manager may have trouble locating acceptable bonds that produce immunized portfolios; finally, both duration and horizon dates change with the mere passage of time, but not in a lockstep fashion, thus rebalancing is required. Although immunization is considered a passive bond portfolio management strategy, considerable rebalancing must occur, as indicated above. The portfolio manager must consider the tradeoffs between the transaction costs and not being perfectly immunized at all times.
Feedback: The rationale for the question is to be certain that the student thoroughly understands duration, how duration is used as a portfolio management tool, and the deficiencies of duration as a portfolio management tool.

Bodie - Chapter 16 #86
Difficulty: Moderate

87. Discuss contingent immunization. Is this form of bond portfolio management strategy an active, passive, or combination of both, strategy?

Contingent immunization is portfolio management technique where the portfolio owner is willing to accept an average annual return over a period of time that is lower than that currently available. The portfolio manager may actively manage the portfolio until (if) the portfolio declines in value to the point that the portfolio must be immunized in order to earn the minimum average required return. Thus, the portfolio will be immunized contingent upon reaching that level. If that level is not reached, the portfolio will not be immunized, and the average annual returns will be greater than those required. Thus, this strategy is considered to be a combination active/passive bond portfolio management strategy.
Feedback: The rationale behind this question is to ascertain that the student understands contingent immunization, how the tool is implemented, and the possible ramifications of the use of the technique.

Bodie - Chapter 16 #87
Difficulty: Moderate

88. Discuss rate anticipation swaps as a bond portfolio management strategy.

Rate anticipation swap is an active bond portfolio management strategy, based on predicting future interest rates. If a portfolio manager believes that interest rates will decline, the manager will swap into bonds of greater duration. Conversely, if the portfolio manager believes that interest rates will increase, the portfolio manager will swap into bonds of shorter duration. This strategy is an active one, resulting in high transactions costs, and the success of this strategy is predicated on the bond portfolio manager's ability to predict correctly interest rate changes consistently over time (a difficult task, indeed).
Feedback: The rationale behind this question is to ascertain if the student understands the risk of one of the most common types of active bond portfolio management strategies and the relationship of this strategy to duration.

Bodie - Chapter 16 #88
Difficulty: Moderate

89. You manage a portfolio for Ms. Greenspan, who has instructed you to be sure her portfolio has a value of at least $350,000 at the end of six years. The current value of Ms. Greenspan's portfolio is $250,000. You can invest the money at a current interest rate of 8%. You have decided to use a contingent immunization strategy.
- What amount would need to be invested today to achieve the goal, given the current interest rate?
- Suppose that four years have passed and the interest rate is 9%. What is the trigger point for Angel's portfolio at this time? (That is, how low can the value of the portfolio be before you will be forced to immunize to be assured of achieving the minimum acceptable return?)
- Illustrate the situation graphically.
- If the portfolio's value after 4 years is $291,437 what should you do?

Calculations are shown below.
- Amount needed to reach the goal = $\$350,000/1.08^6 = \$220,559.37$
- The trigger point = $\$350,000/1.09^2 = \$294,588.00$
- The graph should look like the ones in Figure 16.12 on page 550.
- You should immunize the portfolio because its value is below the trigger point. If the value is $291,437 you will need to earn a rate of 9.59% over the remaining two years to achieve the goal of $350,000: $\$350,000 = \$291,437 * (1+r)^2$. Solving for r yields 9.59%.
Feedback: This question tests the student's understanding of contingent immunization.

Bodie - Chapter 16 #89
Difficulty: Difficult

90. You have purchased a bond for $973.02. The bond has a coupon rate of 6.4%, pays interest annually, has a face value of $1,000, 4 years to maturity, and a yield to maturity of 7.2%. The bond's duration is 3.6481 years. You expect that interest rates will fall by .3% later today.
- Use the modified duration to find the approximate percentage change in the bond's price. Find the new price of the bond from this calculation.
- Use your calculator to do the regular present value calculations to find the bond's new price at its new yield to maturity.
- What is the amount of the difference between the two answers? Why are your answers different? Explain the reason in words and illustrate it graphically.

Calculations are shown below.
- Find new price using modified duration:
Modified duration = 3.6481/1.072 = 3.403 years.
Approximate percentage price change using modified duration = -3.403 * (-.0003) = 1.02%.
New Price = $973.02 * 1.0102 = $982.94 ($982.96 if duration isn't rounded)
- Find new price by taking present value at the new yield to maturity:
N=4, I=6.9%, PMT=64, FV=1000, CPT PV=983.03.
- The answers are different by $0.09. The reason is that using modified duration gives an approximation of the percentage change in price. It should only be used for small changes in yields because of bond price convexity. As you move farther away from the original yield, the slope of the straight line that shows the duration approximation no longer matches the slope of the curved line that shows the actual price changes.
Feedback: This question investigates the depth of the student's understanding of duration, its use in approximating interest rate sensitivity, and the potential shortcomings of using it.

Bodie - Chapter 16 #90
Difficulty: Difficult

ch16 Summary

Category	*# of Questions*
Bodie - Chapter 16	90
Difficulty: Difficult	10
Difficulty: Easy	25
Difficulty: Moderate	55