

Name _____ Section _____ ID # _____

AP/ADMS 3530 3.00 Finance**Midterm Exam – Winter 2015****Friday, February 13, 2015****Type X Exam - SOLUTIONS****Instructors and Sections****Section M**, Irvin Pestano, Thursdays 4-7 pm**Section N**, Samuel Alagurajah, Tuesdays 7-10pm**Section O**, Lois King, Internet**Section P**, Kwok Ho, Fridays 11:30am-2:30pm**Section Q**, Samuel Alagurajah, Wednesdays 7 pm-10pm)**Section R**, Lois King, Mondays 11:30am-2:30 pm**Section S**, Kwok Ho, Mondays 2:30-5:30pm**Section T**, Orlando Lopez, Thursdays, 7-10pm

This exam consists of **40 multiple choice questions** and carries a total of **40 points**. Choose the response that best answers each question. **Circle your answers below, and fill in your answers on the bubble sheet. Only the bubble sheet is used to determine your exam score.** Please do **not** forget to write your name and ID # both at the top of this cover page and on the bubble sheet. Also please write the type of your exam (**X** or **Y**) on the bubble sheet.

Please note the following points:

- 1) **Read the questions carefully and use your time efficiently.**
- 2) Choose the answers that are **closest** to yours, because of possible rounding.
- 3) Keep at least **4** decimal places in your calculations and at least **2** in your final answers and at least **6** for the interest rates.
- 4) *Unless otherwise stated*, interest rates are **annual**, and bonds pay **semiannual coupons** and have a face value (or par value) of **\$1,000**.
- 5) You may use the back of the exam paper as your scrap paper.
- 6) Instructors and invigilators will not answer questions during the exam.

1. When you graduate two years from today your parents have promised to give you \$10,000 a year for five years, starting on graduation day. If the interest rate is 4%, what is the value of that gift today?

- A) \$40,365.59
- B) \$42,805.98
- C) \$43,730.45
- D) \$44,518.22
- E) \$46,298.95

Solution B

This is a delayed annuity (delayed by 1 year!)

Using your calculator, first find PV of an ordinary annuity:

PMT = 10,000; I/Y = 4%, n=5, FV=0, COMP PV → 44,518.22

PV delayed: $44,518.22 / (1.04)^1 = 42,805.98$

2. Your retirement fund's balance is \$50,000 right now. You want to retire in 35 years from today with \$1,200,000 in savings. You can add \$9,000 annually at the end of each year until retirement. What annual interest rate do you need to earn in order to reach your goal?

- A) 3.84%
- B) 4.53%
- C) 5.40%
- D) 6.47%
- E) 11.68%

Solution C

The FV of the 25 payments and the \$50,000 must reach \$1,200,000 (FV)

Using your calculator: PV = 50,000; PMT = 9,000 ; FV = -1,200,000 ; n = 30; COMP I/Y

→ I/Y = **5.40%**

3. How much can be accumulated for retirement if \$1400 is deposited monthly, beginning today, and the account earns 6% APR compounded monthly for 20 years?

- A) \$615,214
- B) \$626,444
- C) \$646,857
- D) \$650,091
- E) \$725,484

Solution D

First find $i_m = 6/12 = 0.50\%$ per month

Use your calculator, set mode to BGN (since this is an annuity DUE)

$PMT = 1400$; $I/Y = .50\%$, $n = 20 \times 12 = 240$, find $FV = \mathbf{\$650,091}$

4. You and your spouse decide to borrow \$300,000 for a home mortgage at a posted rate of 5% (APR semi-annually compounded). If you decide to take a 15-year amortization term for the mortgage, what will be your monthly payment?

- A) \$1,594.00
- B) \$2,214.15
- C) \$2,364.39
- D) \$3,115.66
- E) \$4,242.89

Solution C

The monthly interest rate is given by:

$(1 + i_m)^{12} = 1 + EAR = (1 + 2.5\%)^2 = 1.050625$, that is $i_m = 0.4124\%$

The monthly payment for the 15-year loan

$PV = -\$300,000$; $I = .4124$; $n = 180$, $FV=0$, $COMP$ $PMT \rightarrow 2,364.39$

5. You've borrowed \$15,000 and agree to pay back the loan with monthly payments of \$450. If the interest rate charged by the bank is 8% (APR) and payments start at the end of this month, how long will it take you to pay back the loan?

- A) 3.15 years
- B) 3.27 years
- C) 4.10 years
- D) 4.25 years
- E) 4.85 years

Solution A

$i_m = 8\%/12 = .6667\%$

Using your calculator: Solve for "n" the number of months

$PMT = 450$; $I/Y = .6667\%$, $FV=0$, $PV= 15,000$; $COMP$ $n \rightarrow 37.82$ months = 3.15 years

6. Teachers' Retirement Corp. offers a lifetime annuity to retiring teachers. For a payment of \$90,000 from a retiring teacher at age 65, the firm will pay the teacher \$800 a month until death (with payments starting one month after retirement). If a teacher's life expectancy is 20 years after retirement, what is the effective annual rate on this

annuity?

- A) 7.84%
- B) 8.83%
- C) 9.20%
- D) 10.47%
- E) 11.68%

Solution C

Using your calculator first solve for im:

PV=-90,000; PMT=800; n=240; FV=0; COMP im → 0.7359%

$$\text{EAR} = (1 + 0.007359)^{12} - 1 = \mathbf{9.20\%}$$

7. If the effective annual rate of interest is known to be 16.08 percent on a debt that has quarterly payments, what is the annual percentage rate?

- A) 4.02 %
- B) 15.02 %
- C) 16.50 %
- D) 15.19 %
- E) 16.08%

Solution D

$$(1.1608)^{.25} = 1 + i_q$$

$$1.0380 - 1 = i_q$$

$$.0380 = i_q$$

$$\text{APR} = i_q \times 4 = .1519 \text{ or } 15.19\%$$

8. You are 20 years old today and want to accumulate \$600,000 before your 60th birthday. If you deposited \$2,000 annually starting today into an account that earns 9% interest compounded annually, would you achieve your objective?

- A) no, as the future value of the account would be \$80,000
- B) no, as the future value of the account would be \$506,824
- C) yes, as the future value of the account would be \$675,765
- D) yes, as the future value of the account would be \$736,584
- E) yes, as the future value of the account would be \$767,445

Solution D

Use you calculator and solve for an annuity DUE as the payment starts at the beginning of the period.

$$\text{PMT} = 2,000; \text{I/Y} = 9\%; \text{N} = 40; \text{solve FV} = \mathbf{736,584.}$$

9. Assume that you invest \$1 a year from today and that it grows to \$10 in 40 years. If inflation over this period averaged 5% per annum, then what could you say about the purchasing power of your investment (on average) over this period?

- A) The purchasing power of the investment has remained the same over the period.
- B) The purchasing power of the investment has increased by slightly less than 1% annually over this period.
- C) The purchasing power of the investment has increased by slightly more than 5% annually over this period.
- D) The purchasing power of the investment has increased by approximately 100% annually over this period.
- E) B & C could be correct.

Solution B

PV = \$1; FV = \$10; N = 40 solve for I/Y = 5.925% which is approximately 1% higher than that rate of inflation.

10. You have won a lottery and your prize is \$5,000 paid to you every two years starting 2 years from today. This payment will continue forever (i.e. it will be paid to your family even after you die). It is anticipated that the average interest rate will forever be 5% per annum. All else being the same, what is the minimum single payment you would accept today instead of receiving the \$5,000 payment stream?

- A) \$46,458
- B) \$48,780
- C) \$50,000
- D) \$98,765
- E) \$100,000

Solution B

Analyze this question using 2-year periods to match the frequency of the payments. The 2-year interest rate is $(1 + .05)^2 - 1 = 0.1025 = 10.25\%$

From the perspective of 2-year periods, this is a standard perpetuity.

$$PV = C/r = 5000/.1025 = \mathbf{\$48,780.49}$$

11. You take a loan out to finance your education and are given the following repayment options. Assume that the prevailing interest rate is 6% per annum. Which of the following alternatives of payment is best for you?

- A) Pay \$9,750 now.

- B) \$2,000 per year for 5 years, each payment made at the end of each year.
 C) \$1,950 per year for 5 years, each payment made at the beginning of each year.
 D) \$2,000 at the end of year 1, \$5,000 at the end of year 2, \$3,000 at the end of year 3 and \$1,200 at the end of year 4.
 E) You cannot answer the question as you need to know how much was borrowed.

Solution B

PV (A) = \$9,750;
 PV (B) is the PV of a 5-year annuity = \$8,424.73;
 PV (C) is the PV of a 5-year annuity due = \$8,706.96;
 PV (D) = \$9,806.14.

Choose (B) as it has the lowest PV today.

12. You are purchasing your very first car which was entirely financed (i.e. no down payment) by ABC Bank. You are to make seven annual loan payments of \$5,000 each, beginning three years from today. The loan rate is 6% compounded annually. All else being the same what should be the cash purchase price of the car today?

- A) \$20,250.02
 B) \$21,632.44
 C) \$23,435.38
 D) \$24,841.50
 E) \$27,911.91

Solution D

PV of loan in year 2 the period before the first payment:
 PMT = 5000; n = 7; I/Y = 6, Calculate PV = \$27,911.91

If payments begin 3 years from today, then discount back 2 more periods
 FV = 27,911.91; I/Y = 6; n = 2; Calculate PV = **\$24,841.50**

13. You purchase a \$2,500 big screen TV by putting down a deposit of \$400 today and then making a payment of \$500 in one year and a payment of \$1,169.18 in two years and a final payment of \$Z in three years. If the nominal cost of borrowing over this period is 6% per annum and there is no anticipated inflation then what is \$Z?

- A) \$650.31
 B) \$700.00
 C) \$900.00
 D) \$1,000.00
 E) \$1,119.18

Solution B

The present value of all payments should equal the value of the TV today

$$\$2,500 = \$400 + \$500 / (1.06) + \$1,169.18 / (1.06)^2 + \$Z / (1.06)^3 . \text{ Solving for } Z = \mathbf{\$700}.$$

14. Calculate the price of an 8.50% coupon bond maturing 17 years from now, yielding 6.44% to maturity. The face value is \$1,000 and interest is payable semi-annually.

- A) \$1,000.00
- B) \$1,113.13
- C) \$1,080.38
- D) \$1,178.16
- E) \$1,210.98

Solution E

Using your calculator:

$$FV=1000, n=34; I/Y = 3.22; PMT=42.5 \text{ Comp PV} \rightarrow \mathbf{\$1,210.98}$$

$$\begin{aligned} \text{OR } P_B &= 42.50(PVIFA_{3.22\%,34}) + 1000(PVIF_{3.22\%,34}) \\ &= 42.50(20.4835\dots) + 1000(0.34043\dots) \\ &= 870.549 + 340.431 = 1,210.98 \end{aligned}$$

15. Calculate the yield to maturity of a zero coupon 15 year bond, with current price of \$488.68, and face value of \$1,000? Assume semiannual compounding.

- A) 4.83%
- B) 9.78%
- C) 2.42%
- D) 3.96%
- E) 5.13%

Solution A

Using your calculator:

$$FV=1000, n=30; PMT=0; PV=-488.68 \text{ Comp I/Y} \rightarrow 2.4155\%$$

$$YTM = 2 \times 2.4155\% = \mathbf{4.8311\%}$$

$$\text{OR } P_B = 1000(PVIF_{r\%,30}) = 488.68$$

Solving for r, the solution is 2.4155% per period, therefore, APR = 4.83%.

16. What annual rate of return will be earned by Gordon, who purchases a 15 year bond

with a 4% coupon, holds it for 1 year and at the end of which the yield to maturity is 6%? Assume that the beginning yield to maturity of the bond is 8% and the bond pays interest annually.

- A) 26.72%
- B) 29.88%
- C) 24.13%
- D) -14.31%
- E) -18.07%

Solution B

Using your calculator, find the beginning price:

FV=1000, n=15; PMT=40; I/Y = 8; COMP PV₀ → \$657.62

Using your calculator, find the price at the end of year 1:

FV=1000, n=14; PMT=40; I/Y = 6; COMP PV₁ → 814.10

Annual rate of return = $[40 + (814.10 - 657.62)] / (657.62) = 29.88\%$

17. Two years ago David paid \$977.89 to buy a 10 year, 5% coupon bond and he sold the bond today. He had reinvested all the coupons received during the two years at an APR of 8%. The yield to maturity of the bond today is 6.5%, and the bond pays interest semiannually. The face value of the bond is \$1,000. What was the annual rate of return on his investment?

- A) 1.82%
- B) 3.67%
- C) 2.08%
- D) 3.12%
- E) 2.72%

Solution A

Using your calculator, find the selling price of the bond today:

FV=1000, n=16; PMT=25; I/Y = 3.25; COMP PV → \$907.57

Annual rate of return = $[40 + (814.10 - 657.62)] / (657.62) = 29.88\%$

Holding period rate of return for two years

FV of four \$25 coupons at 4%

PMT=25; n=4; I.Y=4; Pv=0; COMP FV= \$106.16

$$\text{HPR} = [106.16 + 907.57 - 977.89]/977.89 = 3.67\%$$

$$\text{Annual Rate of Return} = [1 + \text{HPR}]^{1/n} - 1 = (1.0367)^{0.5} = 1.82\%$$

18. A 13 year bond with a coupon of 7.5% can be called at 115% of face value in 8 years. The current price of the bond is \$998. If the coupons are payable semi-annually, what is the yield to call?

- A) 8.78%
- B) 4.43%
- C) 8.86%
- D) 3.76%
- E) 7.52%

Solution C

First find FV of bond = 115% x 1000 = 1150

Using your calculator:

FV=1150, n=16; PMT=37.5; I/Y = 3.25; PV= -998; COMP I/Y →4.43%

Yield to call = 2 x 4.43% = **8.86%**

19. The local Municipal Government bonds pay a 6 percent coupon rate, paid semi-annually with 7 years to maturity. What is the current yield on the bond assuming that the yield to maturity on the bond is 8 percent?

- A) 6.52%
- B) 6.71%
- C) 8.53%
- D) 9.31%
- E) 9.68%

Solution: B

N = 14, I/Y = 4, PMT = 30, FV = 1,000, CPT PV = \$894.37.

Current yield = PMT / PV = \$60 / \$894.37 = **6.71%**.

20. If you purchase a four-year, 8% coupon bond (pays semiannually) for \$925 today, how much could it be sold for two years later if interest rates are expected to remain stable over the next two years?

- A) \$964.95

- B) \$958.73
- C) \$1,000.00
- D) \$1,033.17
- E) \$1,122.67

Solution B

The market interest rate is given by: $\$925 = \$40 \times PVIFA(i,8) + \$1,000 \times (1+i)^{-8}$ $i = 5.1683\%$

Two years later, there will be only 4 coupons left, the price will be: $Price = \$40 \times PVIFA(5.1683\%,4) + \$1,000 \times (1+i)^{-4} = \mathbf{\$958.73}$

21. What is the expected constant growth rate of dividends for a stock currently priced at \$42.8, that just paid a dividend of \$2, and has a required return of 12%?

- A) 3.41%
- B) 5.50%
- C) 9.0%
- D) 7.0%
- E) 12.5%

Solution D

Recall: Constant Growth DDM: $P_0 = DIV_1 / (r - g)$ and $DIV_1 = DIV_0 \times (1+g)$;

$$42.8 = 2(1+g) / (.12-g)$$

$$42.8(.12-g) = 2(1+g)$$

$$5.136 - 42.8g = 2 + 2g$$

$$3.136 = 44.8g$$

$$g = 3.136/44.8 = .07 = \mathbf{7\%}$$

22. The dividends of XYZ corp. are forecasted to grow at 20% per year for two years, after which the shares grow at a fixed rate of 6% forever. If the discount rate is 15% and a dividend of \$3 was just paid, what should be the current share price?

- A) \$31.16
- B) \$33.23
- C) \$38.47
- D) \$44.87
- E) \$50.88

Solution D

$$Div_0 = 3$$

$$\text{Div1} = 3 * 1.2 = 3.6$$

$$\text{Div2} = 3 * (1.2)^2 = 4.32$$

$$\text{Div3} = 3 * (1.2)^2 * 1.06 = 4.5792$$

$$P = \text{Div1}/(1+r) + \text{Div2}/(1+r)^2 + P2/(1+r)^2 \quad \text{where } P2 = \text{Div3}/(r-g)$$

$$P = \$3.6/1.15 + \$4.32/(1.15)^2 + 50.88/(1.15)^2$$

$$P = \$3.13 + \$3.27 + \$38.47$$

$$P = \mathbf{44.87}$$

23. Min Development Corporation has just completed a strategic review of its operations and has concluded that there are no growth opportunities in the foreseeable future. Hence, it has announced that it will pay a fixed annual dividend of \$2.40 per share indefinitely, starting next year. If investors require a return of 16 percent on the stock, what price do you expect the stock to be trading at following the announcement?

- A) \$0
- B) \$15
- C) \$16
- D) \$20
- E) \$24

Solution: B

$$P_0 = D/r = \$2.40/0.16 = \$15$$

24. The stock of JDM Financial Group is currently trading at \$80 per share and pays a fixed annual dividend of \$5 per share. If the required rate of return is 15%, what price will the stock sell for one year from today?

- A) \$80
- B) \$85
- C) \$87
- D) \$92
- E) \$97

Solution: C

$$\text{Expected return} = \$80 * 0.15 = \$12$$

$$\$12 = P_1 - \$80 + \$5$$

$$P_1 = \$87$$

25. Magnum Corporation had net income of \$125,000 this past year. Dividends of \$40,000 were paid on the corporation's equity of \$781,250. If Magnum has 250,000

shares outstanding with a current market price of \$12.50 per share, what is the firm's required rate of return?

- A) 5.12%
- B) 5.94%
- C) 10.88%
- D) 12.30%
- E) 16.00%

Solution: D

$$\begin{aligned}
 g &= \text{Plowback ratio} \times \text{ROE} \\
 &= [1 - (40,000/125,000)] \times (125,000/781,250) \\
 &= (0.68 \times 0.16) \\
 &= 0.1088 \text{ or } 10.88\%
 \end{aligned}$$

$$\begin{aligned}
 r &= D_1/P_0 + g \\
 &= \{(40,000/250,000) (1 + 0.1088)\} / 12.50 + 0.1088 \\
 &= 0.0142 + 0.1088 \\
 &= \mathbf{12.30\%}
 \end{aligned}$$

26. AIM stock is currently priced at \$17.65, based on a required return of 12.50 percent. If the dividends are expected to grow at 4 percent per year forever, what is the amount of the expected dividend next year?

- A) \$0.71
- B) \$1.44
- C) \$1.50
- D) \$1.75
- E) \$2.21

Solution: C

$$\begin{aligned}
 P_0 &= D_1/r - g \\
 \$17.65 &= D_1 / (0.125 - 0.04) \\
 D_1 &= \$17.65 \times 0.085 = \mathbf{\$1.50}
 \end{aligned}$$

27. Broadway Capital issued preferred stock five years ago at a price of \$20 per share, on which it pays a fixed annual dividend of \$1.50 per share. Broadway preferred stock currently trades at \$22.05 per share and the treasurer believes that the firm can successfully raise new funds by issuing new preferred shares at \$25 per share. The fixed annual dividend per share on the new preferred shares should be set at:

- A) \$1.50
- B) \$1.70
- C) \$1.88
- D) \$2.00

E) \$2.25

Solution: B

Current dividend yield on old preferred shares = $\$1.50 / \$22.05 = 6.80\%$

Dividend on new preferred shares = $\$25 * 0.068 = \1.70

Conceptual Questions:

28. The decision whether to finance the building of a new manufacturing plant through the sale of shares or the sale of bonds is called:

- A) A capital budgeting decision
- B) An agency decision
- C) An investment decision
- D) A financing decision
- E) An accounting decision

Solution D

29. Which of the following is considered a hybrid form of business organization?

- A) A partnership
- B) A limited partnership
- C) A public corporation
- D) A private corporation
- E) A sole proprietorship

Solution B

30. The rate at which the purchasing power of an investment increases is called:

- A) The nominal rate
- B) The risk-free rate
- C) The inflation rate
- D) The real rate
- E) The annual percentage rate

Solution D

31. Which of the following statements regarding annual percentage rates (APRs) is/are true?

- A) They annualize using simple interest.
- B) They are always less than effective annual rates (EARs).
- C) They equal the interest rate per period compounded by the number of periods per year.
- D) They are the true rate of interest charged
- E) All of the above are true.

Solution A

32. The voting system for corporations in which each director is voted separately and shareholders cast one vote for each share they own is called:

- A) Cumulative voting
- B) Majority voting
- C) Minority voting
- D) Comprehensive voting
- E) Exclusive voting

Solution B (text p. 456)

33. The market value of a firm's equity is determined by:

- A) the difference between book values of assets and liabilities.
- B) multiplying share price at issue by the number of shares issued.
- C) multiplying share market price by the number of shares outstanding.
- D) multiplying share market price by the number of shares authorized.
- E) None of the above.

Solution C

34. An investor who purchases stock in a firm cannot realize a positive return on that investment if the firm pays no dividends. This statement is:

- A) False: The investor will still receive interest payments from the investment.
- B) True: The investor does not receive any cash flows therefore the investment return is zero
- C) False: The investor may realize a capital gain from the appreciation of the stock price
- D) True: The dividend yield is zero
- E) None of the above

Solution C

35. A callable bond is a bond that:

- A) Can provide protection against inflation
- B) Can be converted into shares of stock of the issuing company
- C) Can be repurchased by the issuer prior to its maturity
- D) Can be sold at its nominal value
- E) Can be extended at the maturity date

Solution C

36. All else being the same which of the following is generally in agreement with the principles of compound interest, assuming we invest in interest bearing securities?

- A) The longer you invest the more likely your investment will grow.
- B) Whether you invest for your retirement early or late in life is irrelevant.
- C) The rate at which your retirement investment grows is irrelevant.
- D) The later in life you invest the better off you will be.
- E) A & D are correct.

Solution A

37. Beyoncé has \$60,000,000 in her bank account. She wants to withdraw all her funds when her account reaches \$100,000,000 at which time she will leave Jay Z and marry Sam A. The current rate of return she earns on her account is 6% per annum. If this rate were to decrease over time then which of the following is true:

- A) The balance in her account will increase faster.
- B) It will cause her to wait longer before marrying Sam A.
- C) It will cause the present value of her account to decrease.
- D) It will allow her to withdraw more money sooner.
- E) It will cause the compounding effect to increase.

Solution B

38. Given a future value (greater than zero), which of the following will lead to a lower present value?

- A) More frequent discounting
- B) Lower discount rate
- C) Less time periods
- D) A or B could be correct
- E) None of the above statements are correct.

Solution A

39. Which bond would most likely possess the highest degree of interest rate risk?

- A) 8% coupon rate, 10 years to maturity
- B) 8% coupon rate, 20 years to maturity
- C) 10% coupon rate, 10 years to maturity
- D) 10% coupon rate, 20 years to maturity
- E) 12% coupon rate, 20 years to maturity

Solution B

40. If investors are uncertain that a corporate bond issuer will make all of the bond payments as promised, the investors will demand a higher yield in the form of:

- A) An increased inflation premium.
- B) An increased interest rate risk premium.
- C) An increased real rate of interest.
- D) An increased liquidity risk premium.
- E) An increased default risk premium.

Solution E