

MBA 8622: Corporation Finance Take-Home Problem Set

Instructors:

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Directions:

This take-home problem set (THPS) is due at the begin of the regular class in week 13 (Nov 12-16), 2001, **and has to be turned in physically** (i.e. do not send your answers via e-mail, an electronically turned in THPS will not be graded).

Though you may use your book, notes, etc., all work on this THPS is to be yours alone - any discussion of either the questions on the assignment or your answers with anyone other than the instructor will be considered as cheating and, thus, as a violation of the GSU honor code.

For the multiple choice questions (Part I), record the letter of the correct multiple choice answer directly on the answer sheet on the last page (do not show any intermediate steps, no partial credit will be assigned for multiple choice questions). For the problems with no answer choices (Part II), record your final numeric answer including relevant calculations and intermediate steps on separate sheets of paper (partial credit may be assigned for the problems with no answer choices, if appropriate).

The grade on any assignment turned in after the beginning of class on the relevant date listed above will be reduced at a daily compounded rate of 10% per day (begin mode). For grading purposes, each multiple choice question (Part I) has a grading weight of 1 (one), each question of Part II has a grading weight of 2 (two).

Following:

- Part I: Multiple choice questions (pp. 2-5)
- Part II: Problems and Calculations (pp. 6-8)
- Cover Sheet with answers to Part I (p. 9, to turn in together with the solutions of Part II)

Part I: Multiple Choice Questions

(Record the letter corresponding with the best answer on the answer sheet)

1. Which of the following statements is most correct?
 - a) An investment which compounds interest semiannually, and has a nominal rate of 10 percent, will have an effective rate less than 10 percent.
 - b) The present value of a three-year \$100 annuity due is less than the present value of a three-year \$100 ordinary annuity.
 - c) The proportion of the payment of a fully amortized loan which goes toward interest declines over time.
 - d) Statements a and c are correct.
 - e) None of the answers above is correct.

2. You are willing to pay \$15,625 to purchase a perpetuity which will pay you and your heirs \$1,250 each year, forever. If your required rate of return does not change, how much **would you be willing to pay** if this were a **20-year, annual payment, ordinary annuity** instead of a perpetuity (rounded to the next \$)?
 - a) \$10,342
 - b) \$11,931
 - c) \$12,273
 - d) \$13,922
 - e) \$17,157

3. The risk-free rate, k_{RF} , is 6 percent and the market risk premium, $(k_M - k_{RF})$, is 5 percent. Assume that required returns are based on the CAPM. Your \$1 million portfolio consists of \$700,000 invested in a stock that has a beta of 1.2 and \$300,000 invested in a stock that has a beta of 0.8. Which of the **following statements is most correct**?
 - a) The portfolio's required return is less than 11 percent.
 - b) If the risk-free rate remains unchanged but the market risk premium increases by 2 percentage points, the required return on your portfolio will increase by more than 2 percentage points.
 - c) If the market risk premium remains unchanged but expected inflation increases by 2 percentage points, the required return on your portfolio will increase by more than 2 percentage points.
 - d) If the stock market is efficient, your portfolio's expected return should equal the expected return on the market, which is 11 percent.
 - e) None of the above answers is correct.

4. Ripken Iron Works faces the following probability distribution:

<u>State of the Economy</u>	<u>Probability of State Occurring</u>	<u>Stock's Expected Return if this State Occurs</u>
Boom	0.25	25%
Normal	0.50	15
Recession	0.25	5

What is the **coefficient of variation** on the company's stock?

- a) 0.06
 - b) 0.47
 - c) 0.54
 - d) 0.67
 - e) 0.71
5. If the yield to maturity increased 1 percentage point, which of the following bonds would have **the largest percentage decrease** in value?
- a) A 10-year zero-coupon bond.
 - b) A 10-year bond with an 8 percent coupon.
 - c) A 20-year zero-coupon bond.
 - d) A 20-year bond with an 8 percent coupon.
 - e) A 20-year bond with a 12 percent coupon.
6. A 10-year bond has a 10 percent annual coupon and a yield to maturity of 12 percent. The bond **can be called in 5 years** at a call price of \$1,050 and the bond's face value is \$1,000. Which of the **following statements is most correct**?
- a) The bond's current yield is greater than 10 percent.
 - b) The bond's yield to call is less than 12 percent
 - c) The bond is selling at a price below par
 - d) Both answers a and c are correct
 - e) None of the above answers is correct
7. You have \$2,000 invested in a bank account that pays a 4 percent nominal annual interest with daily compounding. How much money will you have in the account in 132 days from today? (Assume there are 365 days in each year.)
- a) \$2,029.14
 - b) \$2,028.93
 - c) \$2,040.00
 - d) \$2,023.44
 - e) 2,023.99

8. Which of the following is **most correct**?
- a) The present value of a 5-year annuity due will exceed the present value of a 5-year ordinary annuity. (Assume that both annuities pay \$100 per period and there is no chance of default.)
 - b) If a loan has a nominal rate of 10 percent, then the effective rate can never be less than 10 percent.
 - c) If there is annual compounding, then the effective, periodic, and nominal rates of interest are all the same.
 - d) Answers a and c are correct.
 - e) All of the answers above are correct.
9. If it were evaluated with an interest rate of 0 percent, a 10-year regular annuity would have a present value of \$3,755.50. If the future (compounded) value of this annuity, evaluated at Year 10, is \$5,440.22, what **effective annual interest rate** must the analyst be using to **find the future value**?
- a) 7%
 - b) 8%
 - c) 9%
 - d) 10%
 - e) 11%
10. Assume you are to receive a 20-year annuity with annual payments of \$50. The first payment will be received at the end of Year 1, and the last payment will be received at the end of Year 20. You will invest each payment in an account that pays 10 percent. What will be **the value in your account at the end of Year 30**?
- a) \$6,354.81
 - b) \$7,427.83
 - c) \$7,922.33
 - d) \$8,591.00
 - e) \$6,752.46

11. You recently purchased a 20-year investment which pays you \$60 at $t=1$, \$80 at $t=2$, \$100 at $t=3$, \$120 at $t=4$, and some fixed cash flow, X , at the end of each of the remaining 16 years. The investment cost you \$1,387.47. Alternative investments of equal risk have a required return of 6 percent. What is the **annual cash flow received at the end of each of the final 16 years**, that is, **what is X** ?
- a) \$120
 - b) \$125
 - c) \$130
 - d) \$135
 - e) \$140
12. Which of the following statements is **most correct**?
- a) All else equal, an increase in interest rates will have a greater effect on the prices of long-term bonds than it will on the prices of short-term bonds
 - b) All else equal, an increase in interest rates will have a greater effect on higher-coupon bonds than it will have on lower-coupon bonds
 - c) An increase in interest rates will have a greater effect on a zero coupon bond with 10 years maturity than it will have on a 9-year bond with a 10 percent annual coupon.
 - d) All of the statements above are correct
 - e) Answers a and c are correct
13. Jeremy Wintergarden has just purchased a BMW and borrowed \$48,980 towards the purchase. The amount is to be repaid over a period of 5 years in payments of \$1,000 each month. What is the **Annual Percentage Rate (APR)** of the loan?
- a) 0.69%
 - b) 4.08%
 - c) 5.13%
 - d) 8.29%
 - e) 8.61%

14. Foster Industries has a project which has the following cash flows:
- | | |
|--------|---------|
| Year 0 | -300.00 |
| Year 1 | 100.00 |
| Year 2 | 125.43 |
| Year 3 | 90.12 |
| Year 4 | ? |

What cash flow will **the project have to generate in the fourth year** in order for the project **to have a 15% rate of return?**

- a) \$ 15.55
b) \$ 58.95
c) \$100.25
d) \$103.10
e) \$150.75
15. Your portfolio consists of \$100,000 invested in a stock which has a beta = 0.8, \$150,000 invested in a stock which has a beta = 1.2, and \$50,000 invested in a stock which has a beta = 1.8. The risk-free rate is 7 percent. Last year this portfolio had a required rate of return of 13 percent. This year nothing has changed except for the fact that the market risk premium has increased by 2 percent (two percentage points). **What is the portfolio's current required rate of return?**
- a) 5.14%
b) 7.14%
c) 11.45%
d) 15.33%
e) 16.25%
16. Assume an all equity firm has been growing at a 20 percent annual rate and is expected to continue to do so for 3 more years. At that time, growth is expected to slow to a constant 5 percent rate. The firm maintains a 40 percent payout ratio, and this year's retained earnings net of dividends were \$1.5 million. The firm's beta is 1.5, the risk-free rate is 4 percent, and the market risk premium is 6 percent. If the market is in equilibrium, what is the **market value of the firm's common equity** (1 million shares outstanding)?
- a) 17.4 million
b) \$19.1 million
c) \$21.9 million
d) \$28.7 million
e) \$ 47.8 million

Part II: Problems & Calculations

Record your final numeric answer including relevant calculations and intermediate steps (partial credit may be assigned, if appropriate)

17. A 20-year ordinary annuity has a present value of \$1,000,000 (monthly compounded). What is the **amount of each annuity payment** under the following assumptions:
- a) Interest rate = 3% p.a.
 - b) Interest rate = 6% p.a.
 - c) Interest rate = 12% p.a.

18. Henry invests a lump sum of \$10,000 in an account that guarantees 5% (compounded annually) and Abby invests \$10,000 in account guaranteeing 8% (compounded semiannually).
- a) How long will it take the value of Abby's investment to be **twice as much** as Henry's (rounded to the next whole number of years)?
 - b) How long will it take the value of Abby's investment to be **three times** as much as Henry's (rounded to the next whole number of years)?
 - c) How long will it take the value of Abby's investment to be **four times** as much as Henry's (rounded to the next whole number of years)?

(The problem can be solved either mathematically [using logarithms], with excel [using goal seek], or by trial-and-error)

19. The future value of a 20-year annuity due in Euro (the newly created European currency) is Euro 2,000,000. Which is the **underlying annual interest rate** (2 decimal places) under the following assumptions:
- a) The annuity pays an annual amount of Euro 50,000
 - b) The annuity pays an annual amount of Euro 75,000
 - c) The annuity pays an annual amount of Euro 100,000

20. Assume that you won the PowerBall Lottery. You are offered two alternatives. You can either receive \$200 million now or \$12 million per year for the next 30 years, with the first payment being received one year from now. **Which alternative would you choose** if your opportunity cost is
- a) 5% p
 - b) 10% p.a.
 - c) At what opportunity cost are you indifferent between the two alternatives (2 decimal places)?
21. You invest today \$100,000 in a bank account that pays a certain constant nominal annual interest rate of $i\%$, annually compounded. You know that, based on this interest rate, the future value exactly 10 years from today will be \$859,442.55. What would the **future value be** if interest was compounded instead of annually (everything else remains constant)?
- a) semiannually
 - b) quarterly
 - c) monthly
22. Ted and Gina Bartondo recently obtained a 15-year (180-month), \$200,000 mortgage with a 5.75 percent nominal annual interest rate and monthly payments. What will be the **remaining balance on the mortgage**
- a) after four years (i.e. after 48 payments)?
 - b) after eight years (i.e. after 96 payments)?
 - c) after twelve years (i.e. after 144 payments)?
23. At the begin of 1996 John Huberman bought a vacation home in Hinterzarten (Germany), nicely located in the **Black Forest**, at 5000 feet above sea level. The purchase price was DM 250,000 (250,000 Deutschmark). John borrowed 80% of the purchase price with a 20-year, quarterly payable mortgage at a fixed nominal rate of 8% p.a. Since he wanted to pay off the mortgage sooner than scheduled, he has paid an additional DM 1,000 (onethousand Deutschmark) above the required amount on each of the payments he has made from the first payment. Starting in January 2002, the DM will be replaced by the Euro (fixed exchange rate: 1.95583 Deutschmark = 1 Euro). Therefore John's mortgage balance will be converted to Euros right after his payment (in DM) on Jan 1st, and all his future mortgage payments (as well as the additional DM 1,000) will be paid in Euros from then on. At the end of 2002 John will just have made his 28th payment of the mortgage. What will then (i.e. just after the 28th payment) be the **remaining balance on your mortgage**, expressed in **Euros**?
- (It is highly recommended - but not mandatory - to set up a spreadsheet for this problem)*

24. Gordon Sentry faces two investment opportunities: Stock AAA (expected return = 7%, risk = 10%) and Stock BBB (expected return 18%, risk 30%). He decides to invest 60% of his funds in Stock AAA and 40% in Stock BBB. Calculate **risk and expected return of his portfolio** under the following assumption (1 decimal place):

- a) Correlation (AAA, BBB) = +0.7
- b) Correlation (AAA, BBB) = 0
- c) Correlation (AAA, BBB) = -0.4

25. Same situation as in problem 24) above. Additional information:

- The correlation between Stock AAA and Stock BBB is **+0.7**.
- Gordon Sentry has the opportunity to invest in Stock AAA, Stock BBB, and riskless assets

He decides to invest 30% of his funds in riskless assets, 50% in Stock AAA and 20% in Stock BBB. Calculate **risk and expected return of his new portfolio** under the following assumption (1 decimal place):

- a) Expected risk-free return = 3%
- b) Expected risk-free return = 5%
- c) Expected risk-free return = 7%

26. The present value ($t=0$) of the following cash flow stream is \$40,000, when discounted at the discount rates shown below. Calculate the **value of the missing** (i.e., $t=3$) **cash flow** (2 decimal places).

Year	1	2	3	4	5	6
Cash Flow	\$6,000	\$8,000	???	\$4,000	\$7,000	12,000

- a) Discount rate = 10% p.a., semiannual compounding
- b) Discount rate = 6%, quarterly compounding
- c) Discount rate = 0%, monthly compounding

27. It is now January 1, 2001. Trellos Inc. Inc. is expected to to experience a 40% annual growth rate for the next 3 years (years 1-3) and a 25% annual growth rate for the two following years (years 4 and 5). By the end of 5 years, Trellos Inc.'s growth rate will slow to 10% percent per year indefinitely. Stockholder require a return of 14% on Trellos Inc.'s stock. The most recent annual dividend (D_0), which was just paid yesterday, was \$8.00 per share.
- a) Calculate the **value of the stock today**, based on the assumptions above.
 - b) Calculate the **value of the stock today** under the following assumptions:
Growth rate next three years = 20%, growth rate years 4 and 5 = 15%, growth rate after year 5 = 5%, required return on the stock = 18%
28. A Coratis Industries bond has a 10 percent coupon rate and a \$1,000 face value. Interest is paid semiannually, and the bond has 15 years to maturity. If investors require a% nominal yield, what is the **bond's value** and what is the **effective annual yield** on the bond
- a) 12%
 - b) 10%
 - c) 8%

**MBA 8622: Corporation Finance
Fall 2001**

**Take-Home Problem Set
Answer Sheet**

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Name:

Total: / 40

Grade: of 100

Part I: Multiple Choice

1)	2)	3)	4)
5)	6)	7)	8)
9)	10)	11)	12)
13)	14)	15)	16)