

ADM 2350A
October 19, 2011

Midterm Examination Name: _____
Version #1 Solutions Student ID #: _____

Statement of Academic Integrity

The Telfer School of Management does not condone academic fraud, an act by a student that may result in a false academic evaluation of that student or of another student. Without limiting the generality of this definition, academic fraud occurs when a student commits any of the following offences: plagiarism or cheating of any kind, use of books, notes, mathematical tables, dictionaries or other study aid unless an explicit written note to the contrary appears on the exam, to have in his/her possession cameras, radios (radios with head sets), tape recorders, pagers, cell phones, or any other communication device which has not been previously authorized in writing.

Statement to be signed by the student:

I have read the text on academic integrity and I pledge not to have committed or attempted to commit academic fraud in this examination.

Signed: _____

Note: an examination copy or booklet without that signed statement will not be graded and will receive a midterm exam grade of zero.

General Instructions:

1. Please **SIGN** the academic integrity statement above.
2. Please put your **Name and Student ID# on ALL NINE pages** of this exam.
3. This is an **open book and open notes exam**. Notes are **any handwritten or printed materials**, including but not limited to, previous assignments, quizzes, and exams plus their solution sets.
4. The use of **scientific and financial calculators is encouraged**.
5. **Laptop computers or any other devices that can be used for communication are NOT permitted**.
6. Please **do NOT take apart the pages** of this exam.
7. You have **1 hour and 10 minutes** to work this exam.
8. Good Luck!

There are **FOUR multiple-choice problems** on this exam. Each problem counts 5 marks for a total of 20 marks for this exam. **To receive credit for each problem, you must show your work!**

1. Jeannette Hudon wishes to retire on her 55th birthday. She wants to withdraw \$100,000 on each of her 55th through 94th birthdays (i.e. 40 withdrawals). Her life expectancy is 95 years, and she wishes to leave to her heirs \$1,000,000 at that time. (Just in case she does live longer than 95 years, she will dip into the \$1,000,000!) Assuming an interest rate throughout her life of 2%, how much must Jeannette accumulate by age 55 **BEFORE** making her first withdrawal to be able to provide for her retirement years and her bequest of \$1,000,000 and how much must Jeannette deposit at the end of year for thirty five years, assuming she starts her plan at age 20 with deposits on her 21st through 55th birthdays with the deposit on her 55th birthday occurring **BEFORE** her withdrawal on that birthday.
- a. \$5,000,000.00, \$100,011.05
 - b. \$5,000,000.00, \$98,050.05
 - c. \$3,188,438.34, \$62,525.30
 - d. \$3,188,438.34, \$63,775.81
 - e. \$3,243,149.30, \$63,598.19
 - f. \$3,243,149.30, \$64,870.15**
 - g. None of the above.

Scientific Calculator Approach

$$PV_{55} = \$100,000 \times PVIFA_{2\%,40} + \$1,000,000 \times PVIF_{2\%,40}$$

$$PV_{55} = \$100,000 \times (1.02) \times \left[\frac{1 - \frac{1}{(1.02)^{40}}}{0.02} \right] + \frac{\$1,000,000}{1.02^{40}}$$

$$PV_{55} = \$2,790,258.883 + \$452,890.415 = \$3,243,149.30$$

$$PMT = \frac{FV_{55}}{FVIFA_{2\%,35}} = \frac{\$3,243,149.30 \times 0.02}{[1.02^{35} - 1]} = \$64,870.15$$

Financial Calculator Approach

First, set the calculator into the annuity due mode by touching [2ND][BGN][2ND][SET][CE/C]. Then set P/Y = 1, C/Y = 1, N = 40, I/Y = 2, PMT = 100,000, and FV = 1,000,000. CPT PV = - 3,243,149.30.

Press [FV] to enter $-3,243,149.30$ into the FV register. Then set $N = 35$ and $PV = 0$. Now change the calculator to the ordinary annuity mode by touching $[2^{ND}][BGN][2^{ND}][SET][CE/C]$. CPT PMT = $64,870.15$.

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 1

Marking Scheme:

- 1 mark for correct formulation for PV_{55}
- 1 mark for correct value for PV_{55}
- 1 mark for correct formulation for PMT
- 1 mark for correct value for PMT **GIVEN** your FV_{55}
- 1 mark for everything correct

NB. Students using a financial calculator may not show $P/Y = 1$ and $C/Y = 1$, as these are the values that I encourage students to normally keep in their calculators. So, full credit should be given so long as results are correct and all other entries are correct.

2 marks credit for **answer a.** You ignored the time value of money in calculating PV_{55} as $(40 \times \$100,000) + \$1,000,000$. The PMT of \$100,011.05 is correctly calculated **GIVEN** your FV_{55} .

0 marks credit for **answer b.** as you have made 2 errors. First, you have ignored the time value of money by incorrectly calculating PV_{55} as $(40 \times \$100,000) + \$1,000,000$. Second, you calculated the PMT as an annuity due.

0 marks credit for **answer c.** as you have made 2 errors. First, you have incorrectly calculated PV_{55} as an ordinary annuity and second, you calculated the PMT as an annuity due.

2 marks credit for **answer d.** First, you have incorrectly calculated PV_{55} as an ordinary annuity, but you have correctly calculated the PMT as an ordinary annuity **GIVEN** your incorrect FV_{55} .

2 marks credit for **answer e.** First, you have correctly calculated PV_{55} as an annuity due, but you have incorrectly calculated the PMT as an annuity due.

5 marks credit for **answer f.**

Marking for **answer g.** depends on the mistakes that you made.

NB. The marking for answers a. through f. is the **maximum** that you can earn. If you show no work, no credit is awarded. If you arrive at an answer by making multiple different mistakes then those indicated, you may earn less than the maximum.

2. Kenworthy Kartage Company (KKC) expects to pay dividends of \$10.00 for fiscal years 2012 through 2014 and \$12.00 in fiscal years 2015 through 2018. After that, dividends are expected to **INCREASE** at a compounded rate of 6% per year forever. Stocks of similar risk yield 10%. **To the nearest penny**, what should be the price of a share of KKC stock today at the **BEGINNING** of fiscal 2012?
- a. \$318.00
 - b. \$255.24
 - c. \$217.20
 - d. \$250.00
 - e. \$216.63**
 - f. \$191.77
 - g. None of the above.

$$P_7 = \frac{D_8}{k_C - g} = \frac{\$12 \times 1.06}{0.10 - 0.06} = \frac{\$12.72}{0.04} = \$318$$

$$P_0 = \$10 \times PVIFA_{10\%,3} + \$12 \times PVIF_{10\%,3} \times PVIFA_{10\%,4} + \$318 \times PVIF_{10\%,7}$$
$$P_0 = \$24.869 + \$28.579 + \$163.184 = \$216.63$$

Marking Scheme:

- 1 mark for correct formulation of PV of first seven dividends
- 1 mark for correct PV of first seven dividends
- 1 mark for correct value of P_7
- 1 mark for correct PV of P_7
- 1 mark for everything correct

NB. Students might **NOT** show the values for the intermediate results. So long as they formulate the problem correctly, substitute correctly, and obtain the correct final result, they should receive full marks.

One may use the Gordon constant growth model to find $P_6 = \$12/(0.10 - 0.06) = \300 as every dividend after D_7 grows by 6 percent. In this case, one would discount the first six dividends as well as the price P_6 to obtain P_0 . The PV of the first three dividends would be \$24.869, the PV of the next three dividends would be \$22.421, and the PV of P_6 would be \$169.342. One can **NOT**, however, use Gordon's model to directly find any price earlier than P_6 .

Alternatively, one may use an iterative process to find P_0 . First, one would find P_3 as \$255.24, which is the sum of (1) the PV at $t = 3$ of the dividends 4 through 7 that equals \$38.038 plus (2) the PV at $t = 3$ of the price P_7 that equals \$217.198. *If one found P_6 initially, one would find P_3 as the sum of (1) the PV at $t = 3$ of the dividends 4 through 6 that equals \$29.842 plus (2) the PV at $t = 3$ of the price P_6 that equals \$225.394.* Then P_0 would be (1) the sum of the PV of the first three dividends that equals \$24.869 plus (2) the PV of the price P_3 that equals \$191.765.

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ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 2

13. The long-term Government of Canada bond rate is 4 percent, and the estimated risk premium on the market portfolio is 8 percent. Louis Racing Company (LRC) has a stock price of \$100 per share today at the **BEGINNING** of its fiscal year 2012 and an estimated dividend of \$10.00 per share for the forthcoming fiscal year of 2012. Dividends are expected to grow thereafter at 10 percent per year for the foreseeable future.

Required: Use the Dividend Discount Model (i.e. Gordon constant growth model) to estimate the cost of equity k_C and then use the SML of the CAPM Model to find the beta of the stock. k_C is ____ and beta is ____.

- a. 8.00%, 1.00
- b. 12.00%, 1.00
- c. 30.00%, 3.25
- d. 30.00%, 6.50
- e. 20.00%, 4.00
- f. 20.00%, 2.00**
- g. None of the above.

Gordon Constant Growth in Yield Form

$$k_C = \frac{D_1}{P_0} + g = \frac{\$10}{\$100} + 0.10 = 0.10 + 0.10 = 0.20 \text{ or } 20\%$$

SML

$$k_C = RF + (ER_M - RF) \beta_C \Rightarrow \beta_C = \frac{k_C - RF}{ER_M - RF} = \frac{20\% - 4\%}{8\%} = 2.00$$

Marking Scheme:

- 1 mark for correct expression for Gordon constant growth model in yield form
- 1 mark for correct value for k_C
- 1 mark for correct expression for beta
- 1 mark for correct value for beta **GIVEN** student's value of k_C
- 1 mark for everything correct

NB. A student does **NOT** need to find the expression for beta. Instead, if the student substitutes correctly into the standard SML expression and correctly solves for beta, this is fully acceptable.

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ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 3

4. Florence and Frank Saunders wish to buy the home of their dreams in Perth, Ontario. The home costs \$500,000. The CIBC offers to lend them 80% of the purchase price or \$400,000 at a nominal annual rate of 4.00 percent compounded semi-annually for a term of 5 years with an amortization period of 20 years. Since Florence and Frank have saved \$100,000, they are considering the CIBC mortgage. Since Florence and Frank are paid weekly, they elect weekly mortgages payments to match the frequency of their paycheques. **To the nearest penny**, what are their weekly mortgage payments? (Assume that there are **EXACTLY** 52 weeks per year.)
- \$384.62
 - \$1,538.46
 - \$1,696.46
 - \$557.06**
 - \$558.90
 - \$1,698.02
 - None of the above.

Scientific Calculator Approach

$$k_{\text{weekly}} = \left(1 + \frac{QR}{m}\right)^{m/f} - 1 = \left(1 + \frac{0.04}{2}\right)^{2/52} - 1 = 0.00076192963 \text{ or } 0.076192963\%$$

$$PMT = PV_0 \times \left[\frac{k_{\text{weekly}}}{1 - \frac{1}{(1 + k_{\text{weekly}})^n}} \right] = \$400,000 \times \left[\frac{0.00076192963}{1 - \frac{1}{(1 + 0.00076192963)^{52 \times 20}}} \right] = \$557.06$$

Scientific Calculator Marking Scheme

- 1 mark for correct formulation for k_{weekly}
- 1 mark for correct value for k_{weekly}
- 1 mark for correct formulation for PMT
- 1 mark for correctly substituting into PMT expression **GIVEN** your value for k_{weekly}
- 1 mark for everything correct

Financial Calculator Approach

Set P/Y = 52, C/Y = 2, N = 52 x 20 = 1,040, I/Y = 4, PV = 400,000, and FV = 0. CPT PMT = - 557.06.

Financial Calculator Marking Scheme

1 mark for $P/Y = 52$ and $C/Y = 2$

1 mark for $N = 1,040$

1 mark for $I/Y = 4$

1 mark for $PV = 400,000$ and $FV = 0$

1 mark for everything correct

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 4

NB. Students may not show $P/Y = 52$ and $C/Y = 2$. However, so long as they show the other values and correctly calculate PV, they should be given credit for $P/Y = 52$ and $C/Y = 2$. Students may not show $FV = 0$, as this entry is not necessary if the students used the [CLR TVM] function.

1 mark for **answer a.** This answer shows **NO** understanding of the time value of money. The student has merely divided the \$400,000 borrowed by the number of weeks $52 \times 20 = 1,040$ for which the mortgage will be amortized. The mark is awarded because the student did calculate $N = 1,040$ correctly.

0 marks credit for **answer b.** This answer shows **NO** understanding of the time value of money. The student has merely divided the \$400,000 borrowed by the number of weeks $52 \times 5 = 260$ for the term of the mortgage. 260 is **NOT** even the correct number of weeks 1,040 for which the mortgage will be amortized.

3 marks credit for **answer c.** The student confused the term of the mortgage with the amortization period (i.e. N was incorrectly set to 260). Otherwise, the calculations were correct.

5 marks credit for **answer d.**

3 marks credit for **answer e.** The student set $P/Y = C/Y = 52$ instead of $P/Y = 52$ and $C/Y = 2$. Otherwise, the calculations were correct.

2 marks credit for **answer f.** The student incorrectly set $C/Y = 52$ and incorrectly set $N = 260$. Otherwise, the calculations were correct.

Marking for **answer g.** depends on the mistakes that you made.

NB. The marking for answers a. through f. is the **maximum** that you can earn. If you show no work, no credit is awarded. If you arrive at an answer by making multiple different mistakes then those indicated, you may earn less than the maximum.