

ADM 2350N
February 27, 2012

Midterm Examination
Version #1 Solutions

Name: _____
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 60th birthday. She wants to withdraw \$80,000 on each of her 60th through 89th birthdays (i.e. 30 withdrawals). Her life expectancy is 90 years, and she wishes to leave to her heirs \$800,000 at that time. (Just in case she does live longer than 90 years, she will dip into the \$800,000!) Assuming an interest rate throughout her life of 4%, how much must Jeannette accumulate by age 60 **BEFORE** making her first withdrawal to be able to provide for her retirement years and her bequest of \$800,000 and how much must Jeannette deposit at the end of each year for forty years, assuming she starts her plan at age 20 with deposits on her 21st through 60th birthdays with the deposit on her 60th birthday occurring immediately **BEFORE** her withdrawal on that birthday.
 - a. \$1,438,697.17, \$14,557.80
 - b. \$1,438,697.17, \$15,140.11
 - c. \$1,630,017.60, \$16,493.72
 - d. \$1,630,017.60, \$17,153.47
 - e. \$1,685,352.10, \$17,053.64
 - f. \$1,685,352.10, \$17,735.78**
 - g. None of the above.

Scientific Calculator Approach

$$PV_{60} = \$80,000 \times PVIFAD_{4\%,30} + \$800,000 \times PVIF_{4\%,30}$$

$$PV_{60} = \$80,000 \times (1.04) \times \left[\frac{1 - \frac{1}{(1.04)^{30}}}{0.04} \right] + \frac{\$800,000}{1.04^{30}}$$

$$PV_{60} = \$1,438,697.17 + \$246,654.93 = \$1,685,352.10$$

$$PMT = \frac{FV_{60}}{FVIFA_{4\%,40}} = \frac{\$1,685,352.10 \times 0.04}{[1.04^{40} - 1]} = \$17,735.78$$

Financial Calculator Approach

First, set the calculator into the annuity due mode by touching $[2^{ND}][BGN][2^{ND}][SET][CE/C]$. Then set P/Y = 1, C/Y = 1, N = 30, I/Y = 4, PMT = 80,000, and FV = 800,000. CPT PV = - 1,685,352.10.

Press [FV] to enter - 1,685,352.10 into the FV register. Then set N = 40 and PV = 0. Now change the calculator to the ordinary annuity mode by touching $[2^{ND}][BGN][2^{ND}][SET][CE/C]$. CPT PMT = 17,735.78.

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 1

Marking Scheme

- 1 mark for correct formulation for PV_{60}
- 1 mark for correct value for PV_{60}
- 1 mark for correct formulation for PMT
- 1 mark for correct value for PMT **GIVEN** your FV_{60}
- 1 mark for a reasonable attempt at the problem

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.

Marks awarded for any answer require you to show your work and to make the indicated mistakes. **LESS marks may be awarded if you made other than the indicated mistakes.**

- a. 1 mark as you forgot the inheritance and you made the deposits at the beginning of each year
- b. 3 marks as you forgot the inheritance
- c. 1 marks as you made the deposits at the beginning of each year and the withdrawals at the end
- d. 3 marks as you made the withdrawals at the end of each year
- e. 3 marks as you made the deposits at the beginning of each year
- f. 5 marks provided you made **NO** mistakes in deriving this answer
- g. 0 to 4 marks awarded based on marking scheme above

2. Kenworthy Kartage Company (KKC) just paid dividends of \$10.00 per share for fiscal year 2011. For fiscal years 2012 through 2014 the firm expects dividends per share to grow at a 10% compound rate from the fiscal 2011 dividends. Dividends are expected to be \$14, \$15, and \$16 in fiscal years 2015 through 2017, respectively. After that, dividends are expected to **INCREASE** at a compound rate of 5% per year forever from the fiscal 2017 level. 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?
- \$189.66
 - \$247.57**
 - \$289.59
 - \$336.00
 - \$217.57
 - \$252.42
 - None of the above.

$$P_6 = \frac{D_7}{k_C - g} = \frac{\$16 \times 1.05}{0.10 - 0.05} = \frac{\$16.80}{0.05} = \$336.00$$

$$P_3 = \frac{D_4}{(1+k_C)} + \frac{D_5}{(1+k_C)^2} + \frac{(D_6 + P_6)}{(1+k_C)^3} = \frac{\$14}{(1+0.10)} + \frac{\$15}{(1+0.10)^2} + \frac{(\$16 + \$336)}{(1+0.10)^3}$$

$$P_3 = \$12.727 + \$12.397 + \$264.463 = \$289.59$$

$$P_0 = 3 \times \$10 + \$289.59 \times PVIF_{10\%,3}$$

$$P_0 = \$30 + \$217.57 = \$247.57$$

NB. The first three dividends are growing at the same rate as they are being discounted. Hence, they **EACH** have the same present value of \$10. Some students may use the constant growth model to find $P_5 = \$16 / (0.10 - 0.05) = \320 . One, however, can **NOT** in this example use the Gordon constant growth model to find any price before time $t = 5$. This is because D_6 is the first dividend that is related to all succeeding dividends by the constant growth rate $g = 5\%$. Instead of using the iterative approach shown here, some students may directly calculate P_0 by individually calculating the present value of each of the first six (five) dividends and then adding the present value of the price P_6 (P_5). Properly done, all of these approaches are equally valid.

Financial Calculator Approach Using CF Menu and $P_5 = \$320$

| Keystrokes | Display | |
|----------------------------------|------------------------|---------------------|
| [CF][2 nd][CLR WORK] | CF ₀ = 0.00 | |
| [DOWNARROW][1][1][ENTER] | C01 = 11.00 | i.e. D ₁ |
| [DOWNARROW] | F01 = 1.00 | |
| [DOWNARROW][1][2][.][1][ENTER] | C02 = 12.10 | i.e. D ₂ |
| [DOWNARROW] | F02 = 1.00 | |

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 2

| Keystrokes | Display | |
|-----------------------------------|--------------|------------------|
| [DOWNARROW][1][3][.][3][1][ENTER] | C03 = 13.31 | i.e. D_3 |
| [DOWNARROW] | F03 = 1.00 | |
| [DOWNARROW][1][4][ENTER] | C04 = 14.00 | i.e. D_4 |
| [DOWNARROW] | F04 = 1.00 | |
| [DOWNARROW][3][3][5][ENTER] | C05 = 335.00 | i.e. $D_5 + P_5$ |
| [NPV][1][0] | I = 10.00 | |
| [DOWNARROW][CPT] | NPV = 247.57 | |

Marking Scheme:

- 1 mark for correct value of P_6 or P_5
- 1 mark for correct PV of P_6 or P_5 at $t = 0$ or at $t = 3$ if one uses iterative approach
- 1 mark for correct formulation of PV at $t = 0$ of first six (five) dividends if one uses direct approach*
- 1 mark for correct PV at $t = 0$ of first six (five) dividends if one uses direct approach*
- 1 mark for everything correct

Marks awarded for any answer require you to show your work and to make the indicated mistakes. **LESS marks may be awarded if you made other than the indicated mistakes.**

*If one uses the iterative approach, then 1 mark for the correct PV of P_3 at $t = 0$, **GIVEN** the student's value for P_3 , and 1 mark for the correct PV of the first three dividends.

- a. 2 marks as $\$189.66 = \text{PV of } P_6 \text{ at } t = 0$
- b. 5 marks as $\$247.57 = P_0$ provided you made **NO** mistakes in deriving this answer
- c. 2 marks as $\$289.59 = P_3$
- d. 1 mark as $\$336.00 = P_6$
- e. 3 marks as $\$217.57 = \text{PV of } P_3 \text{ at } t = 0$
- f. 2 marks as $\$252.42 = \text{PV of } P_6 \text{ at } t = 3$
- g. 0 to 4 marks awarded based on marking scheme above

3. The long-term Government of Canada bond rate is 5 percent, and the estimated risk premium on the market portfolio (sometimes called the equity risk premium) is 10 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. 10.00%, 1.00
- b. 10.00%, 2.00
- c. 30.00%, 2.50
- d. 30.00%, 5.00
- e. 20.00%, 1.50**
- f. 20.00%, 3.00
- 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

$$k_C = RF + (ER_M - RF) \beta_C \Rightarrow \beta_C = \frac{k_C - RF}{ER_M - RF} = \frac{20\% - 5\%}{10\%} = 1.50$$

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.

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 3

Marks awarded for any answer require you to show your work and to make the indicated mistakes. **LESS marks may be awarded if you made other than the indicated mistakes.**

- a. 2 marks - student confused market risk premium with k_C
- b. 1 mark - student confused market risk premium with k_C and with required market return
- c. 2 marks - student incorrectly calculated k_C
- d. 1 mark - student incorrectly k_C and confused market risk premium with required market return
- e. 5 marks provided that you made **NO** mistakes in deriving this answer
- f. 3 marks - student confused market risk premium with required market return
- g. 0 to 4 marks awarded based on marking scheme on previous page

4. Florence and Frank Zigafoos wish to buy the home of their dreams in Manotick, Ontario. The home costs \$600,000. The CIBC offers to lend them 80% of the purchase price or \$480,000 at a nominal annual rate of 3.99 percent compounded semi-annually for a term of 4 years with an amortization period of 30 years. Since Florence and Frank have saved \$120,000, they are considering the CIBC mortgage. Since Florence and Frank are paid semi-monthly, they elect semi-monthly mortgages payments to match the frequency of their paycheques. **To the nearest penny**, what are their semi-monthly mortgage payments? (There are **EXACTLY** 24 semi-monthly periods per year.)
- \$5,508.50
 - \$5,409.92
 - \$1,138.95**
 - \$1,155.20
 - \$5,413.76
 - \$1,143.92
 - None of the above.

Scientific Calculator Approach

$$k_{\text{semi-monthly}} = \left(1 + \frac{QR}{m}\right)^{m/f} - 1 = \left(1 + \frac{0.0399}{2}\right)^{2/24} - 1 = 0.00164748949 \text{ or } 0.164748949\%$$

$$PMT = PV_0 \times \left[\frac{k_{sm}}{1 - \frac{1}{(1 + k_{sm})^n}} \right] = \$480,000 \times \left[\frac{0.00164748949}{1 - \frac{1}{(1 + 0.00164748949)^{24 \times 30}}} \right] = \$1,138.95$$

Scientific Calculator Marking Scheme

- 1 mark for correct formulation for $k_{\text{semi-monthly}}$
- 1 mark for correct value for $k_{\text{semi-monthly}}$
- 1 mark for correct formulation for PMT
- 1 mark for correctly substituting into PMT expression given your value for $k_{\text{semi-monthly}}$
- 1 mark for everything correct

Financial Calculator Approach

Set P/Y = 24, C/Y = 2, N = 24 x 30 = 720, I/Y = 3.99, PV = 480,000, and FV = 0. CPT PMT = - 1,138.95.

Financial Calculator Marking Scheme

- 1 mark for P/Y = 24 and C/Y = 2
- 1 mark for N = 720
- 1 mark for I/Y = 3.99
- 1 mark for PV = 480,000 and FV = 0
- 1 mark for everything correct

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 4

NB. Students may **NOT** show $P/Y = 24$ and $C/Y = 2$. However, so long as they show the other values and correctly calculate PV, they should be given credit for $P/Y = 24$ and $C/Y = 2$. Students may **NOT** show $FV = 0$, as this entry is **NOT** necessary if the students used the [CLR TVM] function.

Marks awarded for any answer require you to show your work and to make the indicated mistakes. **LESS marks may be awarded if you made other than the indicated mistakes.**

- a. 2 marks - student incorrectly used $P/Y = C/Y = 1$, $N = 4$ and derived this answer as $PMT/24$
- b. 3 marks – student incorrectly used $N = 4 \times 24 = 96$
- c. 5 marks provided that you made **NO** mistakes in deriving this answer
- d. 2 marks - student incorrectly used $P/Y = C/Y = 1$, $N = 30$ and derived this answer as $PMT/24$
- e. 2 marks - student incorrectly used $C/Y = 24$ and $N = 4 \times 24 = 96$
- f. 3 marks – student incorrectly used $C/Y = 24$
- g. 0 to 4 marks awarded based on marking scheme on previous page