École de gestion TELFER School of Management

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ADM 2350M Midterm Examination Name: _____
March 1, 2011 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. Jean Gervais wishes to retire on his 70th birthday. He wants to withdraw \$80,000 on each of his 70th through 89th birthdays (i.e. 20 withdrawals). His life expectancy is 90 years, and he wishes to leave to his heirs \$500,000 at that time. (Just in case he does live longer than 90 years, he will dip into the \$500,000!) Assuming an interest rate throughout his life of 4%, how much must Jean accumulate by age 70 **BEFORE** making his first withdrawal to be able to provide for his retirement years and his bequest of \$500,000 and how much must Jean deposit at the end of year for fifty years, assuming he starts his plan at age 20 with deposits on his 21st through 70th birthdays with the deposit on 70th birthday occurring **BEFORE** his withdrawal on that birthday.

a. \$1,358,908.63, \$8,901.12
b. \$1,315,419.58, \$8,284.87
c. \$1,358,908.63, \$8,558.77
d. \$1,315,419.58, \$8,616.26
e. \$2,100,000.00, \$13,755.42
f. \$2,100,000.00, \$13,226.37
g. None of the above.

Scientific Calculator Approach

$$PV_{70} = \$80,000 \times PVIFAD_{4\%,20} + \$500,000 \times PVIF_{4\%,20}$$

$$PV_{70} = \$80,000 \times (1.04) \times \left[\frac{1 - \frac{1}{(1.04)^{20}}}{0.04} \right] + \frac{\$500,000}{1.04^{20}}$$

$$PV_{70} = \$1,130,715.152 + \$228,193.473 = \$1,358,908.63$$

$$PMT = \frac{FV_{70}}{FVIFA_{4\%,50}} = \frac{\$1,358,908.63 \times 0.04}{\left[1.04^{50} - 1\right]} = \$8,901.12$$

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 = 20, I/Y = 4, PMT = 80,000, and FV = 500,000. CPT PV = - 1,358,908.63.

Press [FV] to enter – 1,358,908.63 into the FV register. Then set N = 50 and PV = 0. Now change the calculator to the ordinary annuity mode by touching [2ND][BGN][2ND][SET][CE/C]. CPT PMT = 8,901.12.

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 1

Scientific & Financial Calculator Marking Scheme

1 mark for correct formulation for PV_{70}
1 mark for correct value for PV_{70}
1 mark for correct formulation for PMT
1 mark for correct value for PMT **GIVEN** your FV_{70}
1 mark for everything correct

NB. Students 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.

2. Rentz Radio expects to pay dividends of $110.00 and $121.00 in years 2011 and 2012, respectively. After that, dividends are expected to **DECREASE** at a compounded rate of 10% per year forever. Stocks of similar risk yield 10%. **To the nearest dollar**, what should be the price of a share of Rentz Radio stock today at the **BEGINNING** of 2011?

   a. $300.00
   b. $650.00
   c. $450.00
   d. $200.00
   e. $544.50
   f. $400.00
   g. None of the above.

$$P_0 = \frac{\$110}{1.10} + \frac{\$121}{1.10^2} + \frac{1}{1.10^2} \times \left[\frac{\$121 \times 0.90}{0.10 + 0.10} \right] = \$200 + \$450 = \$650$$

1 mark for correct formulation of PV of first two dividends
1 mark for correct PV of first two dividends
1 mark for correct formulation of PV of P_2
1 mark for correct PV of P_2
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. Astute students may realize that one only needs to discount for 1 period as the Gordon constant growth model can be used to find P_1.

$$P_0 = \frac{\$110}{1.10} + \frac{1}{1.10} \times \left[\frac{\$121}{0.10 + 0.10} \right] = \$100 + \$550 = \$650$$

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 2

3. The estimated required rate of return on the market portfolio is 10 percent and the long-term Government of Canada bond rate is 4 percent. Kahl Telephone Company (KTC) has a stock beta of 0.80, a stock price of $80 per share today at the beginning of its fiscal year 2011, and estimated dividend of $2.40 per share for the forthcoming fiscal year of 2011. Use the SML of the CAPM to estimate the cost of equity k_C and then solve the Dividend Discount Model (i.e. Gordon constant growth model) for the implied growth rate of dividends. k_C is ____ and g is ____.

a. 12.00%, 9.00%
b. 12.00%, 9.80%
c. 8.80%, 5.80%
d. 8.00%, 5.00%
e. 8.00%, 5.80%
f. 8.80%, 5.00%
g. None of the above.

SML

$$k_C = RF + \left(ER_M - RF\right)\beta_C = 4\% + \left(10\% - 4\%\right) \times 0.8 = 4\% + 4.80\% = 8.80\%$$

Gordon Constant Growth in Yield Form

$$k_C = \frac{D_1}{P_0} + g \Rightarrow g = k_C - \frac{D_1}{P_0} = 8.80\% - \frac{\$2.40}{\$80} \times 100\% = 8.80\% - 3.00\% = 5.80\%$$

1 mark for correctly substituting into the SML formula
1 mark for correct value for k_c
1 mark for correctly substituting into the Gordon constant growth model given your k_C results
1 mark for correct value for g given your k_C results
1 mark for everything correct

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 3

4. Winnie and Will Zimmermann wish to buy the home of their dreams in Manotick, Ontario. The home costs $700,000. The CIBC offers to lend them 80% of the purchase price or $560,000 at a nominal annual rate of 6.00 percent compounded semi-annually for a term of 5 years with an amortization period of 30 years. Since Winnie and Will have saved $140,000, they are considering the CIBC mortgage. Since Winnie and Will are paid twice per month, they elect semi-monthly mortgages payments to match the frequency of their paycheques. **To the nearest penny**, what are their twice-monthly mortgage payments?

a. $778.78
b. $4,666.67
c. $1,677.99
d. $5,407.40
e. $5,396.95
f. $1,663.45
g. None of the above.

Scientific Calculator Approach

$$k_{semi-monthly} = \left(1+\frac{QR}{m}\right)^{m/f} - 1 = \left(1+\frac{0.06}{2}\right)^{2/24} - 1 = 0.0024662698 \; or \; 0.24662698\%$$

$$PMT = PV_0 \times \left[\frac{k_{sm}}{1-\frac{1}{(1+k_{sm})^n}}\right] = \$560,000 \times \left[\frac{0.0024662698}{1-\frac{1}{(1+0.0024662698)^{24\times 30}}}\right] = \$1,663.45$$

Scientific Calculator Marking Scheme

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

Financial Calculator Approach

Set P/Y = 24, C/Y = 2, N = 24 x 30 = 720, I/Y = 6, PV = 560,000, and FV = 0. CPT PMT = - 1,663.45.

Financial Calculator Marking Scheme

1 mark for P/Y = 24 and C/Y = 2
1 mark for N = 720
1 mark for I/Y = 6
1 mark for PV = 560,000 and FV = 0
1 mark for everything correct

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.

ADDITIONAL SPACE IS PROVIDED FOR WORKING PROBLEM 4