9.220 Corporation Finance   Professors: A. Dua, J. Falk, and R. Scott
Mid-term Examination   October 24, 2005 7:00 p.m. - 9:00 p.m.

Note: it is your responsibility to verify that this questionnaire has 14 pages.

Name:
ID number:
Check (√) the section in which you are registered. (   ) L01 (Dua, T Th 8:30 – 9:45) (   ) L02 (Falk, T Th 1:00 – 2:15) (   ) L03 (Scott, T Th 2:30 – 3:45)

- Write or print legibly in the space provided for answering the question.
- Section I of the exam has 20 multiple-choice questions worth 1 mark **each**. Answer all multiple-choice questions on your bubble sheet.
- Section II of the exam contains 6 long-answer questions worth a total of 45 marks. Answer all questions in the spaces provided. **Show all relevant work** (i.e., formulas and substitutions). DO NOT INDICATE WHICH CALCULATOR BUTTONS YOU HAVE PRESSED. **Do not round any intermediate calculations**.
- **Rounding rules:**
  - Final dollar answers should be rounded to 2 decimal places, unless otherwise specified.
  - Final interest rate answers should be rounded to 6 decimal places if stated as a percentage, and 6 decimal places otherwise, unless otherwise specified.
  - Other final answers may be rounded to 8 decimal places, unless otherwise specified.
- DO NOT FORGET TO RESET YOUR CALCULATOR AFTER EACH QUESTION TO "1 P/YR" AND PAYMENTS AT THE "END" MODE.
- GOOD LUCK AND ENJOY THE EXAM!

Question	**Maximum Total Marks**	**Marks Awarded**
Multiple Choice	20	
Long Q. 1	5	
Long Q. 2	8	
Long Q. 3	8	
Long Q. 4	4	
Long Q. 5	5	
Long Q. 6	15	
Total Marks	**65**	

UNIVERSITY OF MANITOBA
Faculty of Management
Department of Accounting and Finance

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I. Multiple Choice Section:

Each of the following questions is followed by several suggested answers or completions. Select the best alternative and place the corresponding letter on the accompanying computerized answer sheet. (Value: 20 × 1 = 20 points)

1. The costs of resolving the potential conflicts between managers and shareholders are known as
   a) **agency costs.**
   b) set-of-contracts costs.
   c) investment costs.
   d) contingent claims.
   e) capital structure costs.
   f) both a) and b) above.
   g) both b) and d) above.
   h) both d) and e) above.
   i) none of the above.

2. The TimeNow Corporation had 2001 fixed assets of $1345, current assets of 260, current liabilities of 180 and shareholder's equity of 775. The 2000 fixed assets were 1060, current assets of 220 long-term liabilities of 610 and shareholder's equity of 630. What was the change in net working capital for TimeNow in 2001?
   a) 80
   b) **-100**
   c) 20
   d) 60
   e) 160
   f) none of the above

3. Consider a two-period world (as in chapter 4). An investment should be made in period 0 if
   a) desired consumption in period 0 is less than income.
   b) desired consumption in period 1 is greater than income.
   c) **return on the investment is greater than the risk-free interest rate.**
   d) return on the investment is less than the interest rate.
   e) each of a), b), and c) are true.
   f) only a) and b) are true.

4. Tommy has $60,000 to spend today. He has a real investment opportunity that, if taken, would leave him with $30,000 to spend today and $56,250 to spend one year from today. He desires to consume $10,000 this year and $78,750 next year. With the investment opportunity, he faces a maximum consumption today of $80,000; his maximum possible consumption one year from now is $90,000. Select the following statement that is true.
   a) The net present value of the investment is $26,250.
   b) There is not enough information given to determine the net present value of the investment opportunity.
   c) **Tommy will need to invest $30,000 in real assets and $20,000 in the financial markets to achieve his consumption needs in both years.**
   d) There is not enough information given to determine the amount Tommy needs to invest in real assets and financial markets.
   e) Both a) and c) are true.
   f) Both b) and d) are true.
   g) None of the above are true.

5.   A change in interest rates in the financial markets will
   a)   cause some patient people to become less patient.
   b)   cause some impatient people to become more patient.
   c)   increase current consumption amounts and decrease future consumption amounts.
   d)   decrease current consumption amounts and increase future consumption amounts.
   e)   cause both a) and c).
   f)   cause both a) and d).
   g)   cause both b) and c).
   h)   **cause both b) and d).**
   i)   have none of the above impacts.

6.   If you have a choice to earn simple interest on $10,000 for three years at 8% or compound interest at 7.5% for three years which one will pay more and by how much?
   a)   Simple interest by $1,500.
   b)   **Compound interest by $22.97**.
   c)   Compound interest by $150.75
   d)   Simple interest by $150.00
   e)   None of the above

7.   Which of the following amounts is closest to the end value of investing $9,000 for 7 years at a continuously compounded rate of 11%?
   a) $18,685.44
   b)   **$19,437.90**
   c) $19,369.83
   d) $15,930.00
   e)   None of the above.

8.   You are a financial analyst and one of your clients has just advised you that they intend to retire 25 years from today. After a thorough analysis of your client's needs, you determine that a sum of $1,050,000 will be required to meet her financial needs. Your client advises that she will make quarterly contributions starting 3 months from today and continue those payments until retirement. You determine that you will be able to invest her contributions at an effective annual rate of return of 8%. You then advise that her quarterly payment will need to be
   a) $14,851.14
   b) $3,362.88
   c)   **$3,487.73**
   d) $38,888.89
   e) $14,362.72

9.   The present value of a growing annuity of 6 annual payments where the first payment of $12,000 is today, each subsequent payment is 10% greater than the previous payment, and the effective annual discount rate is 10% is
   a)   65,551.43
   b)   **72,000.00**
   c)   68,454.23
   d)   67,771.55
   e)   not determinable since the growth rate equals the discount rate

10.   Given 12% per year, compounded quarterly, what is the equivalent rate per year compounded semi annually
   a)   **12.18%**
   b)   12%
   c)   6.09%
   d)   11 %
   e)   6%

11. Given the opportunity to invest in one of the bonds listed below and that investors have neither a preference for short or long term investments, which bond provides the best investment opportunity?

Bond	Face value	Maturity (years)	Coupon rate (paid annually)	Required rate of return (effective per year)	Price
A	$1,000	1	4%	5.55%	$990
B	$1,000	17	7.5%	7.55%	$990
C	$1,000	25	8.5%	8.55%	$990

    a) Bond A
    b) Bond B
    c) Bond C
    d) Each bond provides an equally attractive investment opportunity.
    e) None of the bonds provide a more attractive investment opportunity than the other.
    f) More information is needed before providing a definite answer.

12. Suppose that an investor disagrees with market expectations and believes that the forward rate ($_1f_2$) prevailing in the financial markets is higher than what it should be. If the investor is right, he could make an additional profit by:
    a) selling a 2-year discount bond now.
    b) selling a 1-year discount bond now, and buying it back one year from now.
    c) selling a 2-year discount bond now and buying it back one year from now.
    d) buying a 2-year discount bond now.
    e) buying a 1-year discount bond now, and selling it one year from now.
    f) buying a 2-year discount bond now and selling it one year from now.
    g) doing none of the above.

13. When the IRR system for evaluating projects is used,
    a) there must be exactly as many IRR's as there are sign changes in the cash flows.
    b) a disadvantage of this method is that some cash flows will be ignored.
    c) the result of evaluating mutually exclusive projects may differ from the evaluation of the NPV rule if the two projects have a different scale of investment and cash flow returns.
    d) it should always be applied in conjunction with the discounted payback system of project evaluation.
    e) none of the above is true.

14. Consider the following bond trading figures taken from the financial section of a Canadian newspaper.

Company	Coupon	Mat.Date	Bid $	Yld%
HydOne	6.930	Oct 24/32	112.59	6.00

    a) The bond is currently selling for 112.59% of its face value.
    b) The bond will pay coupons of $34.65 every October.
    c) The bond is priced in such a way that investors will realize an effective return of 6% per year.
    d) The bond will pay investors 27 more coupon payments.
    e) Only two of the above answers are correct.
    f) More than two of the above answers are correct.
    g) None of the above answers is correct.

15. What is the nominal rate of interest given a real rate of interest of 5% and an inflation rate of 7%?
    a) 12.0%.
    b) 2.0%.
    c) 12.35%.
    d) 1.90%.
    e) none of the above

| Use the following information for Questions 16 to 18. |

Hardchoice Corp. is a firm considering prospective capital budgeting projects. Selected data on the projects follow:

Project	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
A	-400	100	110	120	130	140
Cash flow signs of Project B-A	+	-	-	-	-	-
C	-200	100	100	100	100	100
D	-400	140	130	120	110	100

16.   Consider only projects A and B. They are mutually exclusive opportunities. If the IRR of the incremental cash flows of taking B instead of A is 12% and the discount rate (hurdle rate) for IRR is 15% then what is your decision about accepting or rejecting projects A and B?
   a)   Accept both project A and project B.
   b)   Reject both project A and project B.
   c)   Accept project A; reject project B.
   d)   Accept project B; reject project A.
   e)   None of the above is correct, as the projects cannot be compared in this manner.

17.   Ignoring the information in question 16, assume instead that projects A and C are independent, Hardchoice is subject to capital rationing, and the relevant discount rate is 10%. Which of the following statements is true?
   a)   **Project A returns $1.12 per $1.00 invested.**
   b)   Project A returns $1.1430 per $1.00 invested.
   c)   Project A should be ranked ahead of project C.
   d)   Both a) and b) are true.
   e)   Both b) and c) are true.
   f)   None of the above is true.

18.   Consider the following statements and select the one that is true.
   a)   The NPV of project D will be much more sensitive to changes in the discount rate than will the NPV of project A.
   b)   If projects C and D are mutually exclusive, incremental analysis indicates that one should reject project C and accept project D.
   c)   **It is possible for projects A and D to have the same NPV.**
   d)   All of the above are true.
   e)   None of the above is true.

19.   Sales for year 2 of a new project are expected to increase by 10%. Current assets are expected to increase by 17% for every dollar increase in sales while accounts payable are expected to increase by 6%. For year 2 the change in cash flows due to working capital will be:
   a)   +10% of sales
   b)   -1.1% of sales
   c)   -10% of sales
   d)   +1.1% of sales
   e)   **None of the above**

20.   In Capital Cost Allowance calculations, which of the following is not related to the current amount in the Undepreciated Capital Cost (UCC) account?
   a)   The CCA charged last year.
   b)   **The corporate tax rate.**
   c)   The CCA rate for the capital asset.
   d)   The original cost of the capital asset.
   e)   The UCC of a previous year.

II. Long Answer Section: (45 marks)

Answer each question in the spaces provided. Show all relevant work (i.e., formulas and substitutions). Do _NOT_ indicate which buttons were pushed on your calculator. <u>Do not round any intermediate calculations.</u> Final dollar answers should be rounded to two decimal places. Final interest rate answers should be rounded to 6 decimal places if stated as a percentage (12.345678%), and 8 decimal places otherwise (0.123456787), unless otherwise specified.   Other final answers may be rounded to 6 decimal places, unless otherwise specified.

Problem 1   (5 marks)

Sandy Struthers is contemplating her possible consumption patterns for this year and next. She knows that she will have income of $50,000 this year and $55,000 next year. Her plan is to consume $40,000 this year (t = 0). She is also aware of a one year investment opportunity at t = 0 that will require an investment of $30,000. This investment has a positive NPV of $450. She decides to take the investment and is further advised that the return on the investment at t = 1 is 9.62%. What consumption at most can she expect at t = 1?

$$NPV = -C_0 + \frac{C_1}{1+r}$$

$$450 = -30,000 + \frac{30,000(1.0962)}{1+r}$$

$$r = 8\%$$

At t = 0:   At t = 1:

Income:	$50,000	Income:	$55,000
Consumption:	-40,000	Payback of Loan: -20,000(1.08) =	-21,600
Investment:	-30,000	Investment return: 30,000(1.0962) =	32,886
Borrowing:	$20,000	Consumption:	$66,286

Problem 2   (8 marks)

You have decided to donate to the Asper School of Business money for an endowment in honour of your successful completion of your Bachelor Commerce degree. This endowment will be used to grant one scholarship every year forever to cover the full tuition for one student. Currently the annual tuition fee is $4,000 and is expected to increase at a rate of 1% per year forever. The first scholarship will be given two years after you have made your last payment to the endowment. You will give the money to the Asper School of Business starting today and will continue to pay an equal amount of money every year for each of the next ten years. Your employer has agreed to help pay for the scholarship. She will make a single matching payment when you make your last payment. The employer will match your total contribution plus any interest that the Asper School has earned on your contributions. If the effective annual interest rate is 10% how much must you deposit each year to accomplish you goal?

$$\textbf{PV of scholarship perpetuity at period 11} = \frac{C_1}{r-g}$$

$$= \frac{4,000(1.01)^{12}}{.10 - .01}$$

$$= \$50,081.11$$

$$\textbf{PV of scholarship perpetuity at period 10} = \frac{PV_{11}}{(1+r)^T}$$

$$= \frac{50,081.11}{(1.1)^1}$$

$$= \$45,528.28$$

$$\textbf{Your share of the required fund} = \frac{45,528.28}{2}$$

$$= \$22,764.14$$

$$\textbf{PV}_{-1} \textbf{ of required fund} = \frac{FV}{(1+r)^T}$$

$$= \frac{22,764.14}{(1.1)^{11}}$$

$$= \$7,978.69$$

$$\textbf{Payment required comes from PV} = \frac{C}{r}\left[1 - \frac{1}{(1+r)^T}\right]$$

$$7,978.69 = \frac{C}{0.1}\left[1 - \frac{1}{(1.1)^{11}}\right]$$

$$= \$1,228.42$$

Problem 3   (8 marks)

Red Corporation stock has an expected return of 12.36% per year (effective). Dividends are paid semiannually and are currently growing at a rate of 7% every six (6) months. The last dividend, $5, was paid 4 months ago. Following the dividend paid thirty-two (32) months from now, dividends are expected to grow at a rate of 6% every six (6) months. Following the dividend paid seventy-four (74) months from now, dividends are expected to decrease at a rate of 7% every six (6) months, forever. What should Red's stock be selling for today?

Data setup:

Effective semi-annual "r" $= (1.1236)^{1/2} - 1 = 6\%$

$D_1 = 5(1.07) = \$5.35$

$D_{38} = 5.35(1.07)^5(1.06) = \$7.95$

$D_{80} = 5.35(1.07)^5(1.06)^7(1 - .07) = \$10.49$

$$PV_{-4} \text{ of 7\% growing annuity} = \frac{C_1}{r-g}\left[1-\left(\frac{1+g}{1+r}\right)^T\right]$$

$$= \frac{5(1.07)}{.06-.07}\left[1-\left(\frac{1.07}{1.06}\right)^6\right]$$

$$= \$31.01$$

$$PV_0 \text{ of 7\% growing annuity} = PV_{-4}(1+r)^T$$

$$= 31.01(1.06)^{4/6}$$

$$= \$32.24$$

$$PV_{32} \text{ of central annuity} = n\left(\frac{C_1}{(1+r)}\right)$$

$$= 7\left(\frac{5.35(1.07)^5(1.06)}{1.06}\right)$$

$$= \$52.53$$

$$PV_0 \text{ of central annuity} = \frac{PV_{32}}{(1+r)^T}$$

$$= \frac{52.53}{(1.06)^{32/6}}$$

$$= \$38.50$$

$$PV_{74} \text{ of final decreasing perpetuity} = \frac{C_1}{r-g}$$

$$= \frac{5.35(1.07)^5(1.06)^7(1-0.07)}{0.06-(-0.07)}$$

$$\$80.71$$

$$PV_0 \text{ of final decreasing perpetuity} = \frac{FV}{(1+r)^T}$$

$$= \frac{80.71}{(1.06)^{74/6}}$$

$$= \$39.34$$

$$\text{Current price} = 32.24 + 38.50 + 39.34$$

$$= \$110.07$$

Problem 4   (4 points)

Spot rates of interest for Government of Canada bonds are observed for different terms to maturity as follows:

Term to maturity	Rate (r_i)
1 year from today	6.10%
2 years from today	6.30%
3 years from today	6.50%
4 years from today	6.75%

Consider a three-year bond with annual coupons (paid annually) of $100 and a face value of $1,000 paid at maturity

1.   What is the current price of the bond?   **(1 point)**

$$PV = \frac{C_1}{1+r_1} + \frac{C_2}{(1+r_2)^2} + \frac{C_3}{(1+r_3)^3}$$

$$= \frac{100}{1.061} + \frac{100}{(1.063)^2} + \frac{1,100}{(1.065)^3}$$

$$= \$1,093.38$$

2.   What is its yield to maturity?   **(1 point)**

$$PV = \frac{C}{r}\left[1 - \frac{1}{(1+r)^T}\right] + \frac{FV}{(1+r)^T}$$

$$1,093.38 = \frac{100}{r}\left[1 - \frac{1}{1+r)^3}\right] + \frac{1,000}{(1+r)^3}$$

   effective annual r = 6.475768%/year compounded annually.
   yield-to-maturity = 6.374192%/year compounded semi-annually.

3.   What is the expected price of the bond in 2 years?
   a)   under the Pure-Expectations Hypothesis   **(1point)**

$$_2f_3 = \frac{(1+r_3)^3}{(1+r_2)^2}$$

$$= \frac{(1.065)^3}{(1.063)^2}$$

$$= 6.90112959$$

$$PV = \frac{FV}{(1+\,_2f_3)}$$

$$= \frac{1,100}{1.0690112959}$$

$$= \$1,028.99$$

   b)   under the Liquidity-Preference (Augmented Expectations) Hypothesis, assuming $_2f_3$
         overstates $E[_2r_3]$ by 1%
         (1point)

$$PV = \frac{FV}{1+E[_2r_3]}$$

$$= \frac{1,100}{1+(0.0690112959-.01)}$$

$$= \$1,038.70$$

Problem 5   (5 marks)

Consider the following independent investment opportunities.   Assume cash flows occur uniformly throughout each year.

Project	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
A	-100,000	10,000	10,500	159,000	60,000	-60,000
B	-100,000	60,000	20,500	39,000	60,000	-60,000
C	-100,000	60,000	20,500	39,000	600,000	0

1.   Calculate the payback period for each project   **(1 mark)**

Payback project A = _____years.

Payback project B = _____years.

Payback project C = _____years.

   Answer: 2.5 years each project the same.

2.   If management uses the payback method to evaluate projects, and the rule is set at three (3) years for the payback method, which project(s) should be accepted?   **(1 mark)**

   Answer: all 3 should be chosen, as they all meet the criteria.

3.   List three (3) problems with the payback method. Use the projects above to explain and support your statements.   **(3 marks)**

Answer:
   - <u>**Time value of money / timing of cash flows is ignored**</u> **(projects with large inflows earlier are more valuable than projects with large cash inflows later on). E.g. project B would be more valuable than project A, yet management will view them as equally valuable.**

   - <u>**Cash flows after the cutoff period are ignored**</u>**. Project C is clearly more valuable than project B, but management will be indifferent between the two projects.**

   - **In all cases, an <u>arbitrary cutoff</u> rule is established by management. The fact that is "arbitrary" (management decision) may preclude any projects that an alternative evaluation method would find acceptable.**

Problem 6   (15 marks)

Prairie Construction Limited (PCL) is a construction company with an impeccable record of performance in Western Canada. You have been asked by the company to analyze the following project using an NPV analysis. Assume that you are a neophyte financial advisor with the company and that your future with the company depends on your analysis. As part of your assignment you have been informed by the Director of Finance for PCL that the appropriate discount rate for a project of this risk is 17%. Your analysis of PCL's tax returns indicates that PCL's average income tax rate is 35%.

PCL is currently considering a project in which they would extensively renovate the Winnipeg Health Sciences Centre over a five-year period. The project would be worth $80,000,000 in revenues that would be received over the five-year life of the project. The contract would provide for revenues of $10,000,000 per year in each of the first two years of the project and revenues equally divided over each of the remaining years of the project. PCL estimates that its expenses associated with the project would be $3,000,000 in the first year of the project but that these expenses would decline at 1% per year for the remainder of the project. For purposes of any analysis assume that these cash flows and the associated tax consequences occur at the end of each year.

For this project PCL would have to invest extensively in some special new equipment. The expected investment would be $12,000,000. This equipment would be part of an extensive array of PCL equipment and would be placed in a CCA class with a CCA rate of 30%. PCL has many assets in this class and the UCC of this class is currently $325,621,086. At the end of the project PCL expects to be able to sell this special equipment to a competitor in the construction field for $4,000,000.

One of PCL's major concerns is that if they accept the Health Sciences project they will be obliged to forego an alternate contract with the province of Manitoba, inasmuch as they wouldn't have the capacity to undertake both major contracts. This provincial contract would have netted them $4,000,000 per year in net income (before taxes) over the next 3 years. Assume that these cash flows and any tax consequences occur at the end of each year.

PCL also believes that the additional working capital required as a result of undertaking the project will be as follows:

Year 0	$1,000,000
Year 1	$2,500,000
Year 2	$3,000,000
Year 3	$2,000,000
Year 4	$4,500,000
Year 5	$0

Another of PCL's major concerns is that if they reject the potential contract with the province of Manitoba, it will impugn their reputation as a reputable and quality contractor and that they will lose business as a result. They estimate that the potential losses will be $3,000,000 (before taxes) per year for each of the next 6 years. (Assume that these losses and any related tax consequences will occur at the end of each year.) After that time (and because of the expected success of the Health Sciences Project) PCL expects that business will return to pre-project levels.

Perform an NPV analysis to determine if PCL should accept or reject the Health Sciences Renovation project.

PV of capital outlay = -$12,000,000

Operating Cash Flows:

Cash Revenues:

$$PV = \frac{\$10,000,000(1-0.35)}{(1+0.17)} + \frac{\$10,000,000(1-0.35)}{(1+0.17)^2} +$$

$$+ \frac{1}{(1+0.17)^2}\frac{\$20,000,000(1-0.35)}{0.17}\left(1 - \frac{1}{(1+0.17)^3}\right)$$

$$= \$10,303,894 + \$20,983,713 = \$31,287,607$$

Cash Expenses:

$$PV = \frac{-\$3,000,000(1-0.35)}{0.17+.01}\left(1 - \frac{(1-0.01)^5}{(1+0.17)^5}\right) = -\$6,134,297$$

1/2 off for each error (above)

Capital Cost Allowance Effects:

$$PV \text{ of CCA} = \frac{\$12,000,000(0.3)(0.35)}{(0.17+0.3)}\left(\frac{(1+0.5(0.17))}{1+0.17}\right) - \frac{\$4,000,000(0.3)(0.35)}{(0.17+0.3)}\frac{1}{(1.17)^5}$$

$$= \$2,486,088 - \$407,589 = \$2,078,499$$

Salvage:

$$PV = \frac{\$4,000,000}{(1.17)^5} = \$1,824,445$$

Opportunity cost for lost net income:

$$PV = \frac{-\$4,000,000(1-0.35)}{0.17}\left(1 - \frac{1}{(1+0.17)^3}\right) = -\$5,744,921$$

Change in Net Non-Cash Working Capital:

	Level	Incremental	Cash Effect
Year 0	$1,000,000	+$1,000,000	-$1,000,000
Year 1	$2,500,000	+$1,500,000	-$1,500,000
Year 2	$3,000,000	+$ 500,000	-$ 500,000
Year 3	$2,000,000	-$1,000,000	+$1,000,000
Year 4	$4,500,000	+$2,500,000	-$2,500,000
Year 5	$0	-$4,500,000	+$4,500,000

$$PV = -\$1,000,000 - \frac{\$1,500,000}{1.17} - \frac{\$500,000}{1.17^2} + \frac{\$1,000,000}{1.17^3} - \frac{\$2,500,000}{1.17^4} + \frac{\$4,500,000}{1.17^5} = -\$1,304,562$$

Side-effects of loss of government contracts

$$PV = \frac{-\$3,000,000(1-0.35)}{0.17}\left(1-\frac{1}{(1+0.17)^6}\right) = -\$6,998,910$$

NPV= -$12,000,000+$31,287,607-$6,134,297+$2,078,499+$1,824,445-$5,744,921-$1,304,562-$6,998,910 = $3,007,861