SIMON FRASER UNIVERSITY
Faculty of Business Administration

Midterm Examination

BUS 417 10-3
Security Analysis

Rules for Submission: Answers to questions in Part I are to be typed, single spaced, of maximum length 1 page **each** for all questions, with 1" margins and type point not less than 12. (This assignment is typed in 12 point. Both a) and b) parts have to be contained within one page.) Violations will be subject to deductions. There are is a one page constraint for Part II, Question 1. There is no constraint for other sections of Part II. Assignments are due in class, Thurs., Oct.. 28, 2010. Be sure to answer all parts of each question.

PART I. ESSAY QUESTIONS. 20 pts. per question -- 10 pts. each for a) and b).

1. a) Contrast the solutions to the life annuity valuation problem developed by de Witt and de Moivre. Be sure to explain: the connection of the pricing formulas to pricing using discounted expected value; relevant assumptions used to obtain the solutions; and, to identify the limitations for each of the solutions.
b) Assuming arithmetically declining survival rates and an interest rate of 5%, what is the Macaulay duration of a life annuity for a 45 year old person that cannot live beyond 100 years.

2.a) An important drawback of "traditional yield spread analysis" is the "failure to take into account future interest rate volatility that would affect the expected cash flow" of a fixed income security. What is option adjusted spread analysis? How does this technique correct for the "failure" of traditional yield spread analysis in the valuation of bonds with embedded option features? Once the option adjusted spread has been determined, how can the cost of option be calculated? What are some important pitfalls of using option adjusted spread analysis to value mortgage backed securities and other collateralized debt obligations?
b) "For a callable bond, it is inappropriate to use modified duration (and convexity) because the expected cash flow changes as the yield changes....A change in interest rates will affect the price volatility of the noncallable bond component depending on the duration of the noncallable bond. It will also affect the price of the embedded call option." Explain how the option adjusted duration measure is derived and how this measure and the option adjusted convexity measure can be used in the analysis of callable bonds. How would your answer change if the bond is extendible instead of callable?

3.a) "Whether the bond market moves up or down, high-convexity portfolios will always outperform low-convexity portfolios of equal duration and yield." Explain the argument supporting this statement and the connection to the classical immunization strategy. What factors would tend to undermine the validity of the statement?
b) Explain this statement: "...the larger the convexity on a portfolio, the less the value of the portfolio rises over time if the interest rate remains unchanged." What are the implications of this result for the asset/liability managers seeking to control interest rate risk for a the fixed income portfolio of

a depository institution? Is it true that "the cost of a higher convexity is a lower yield"? (Hint: In your answer be sure to address the tradeoff between time value and convexity.)

PART II: NUMERICAL, MATHEMATICAL AND DEFINITIONS QUESTIONS
(40 points: 15 pts, for 1.; 15 pts. for 2.; 10 pts. for 3.)

1. Within the one page constraint for parts i)-iv), define the following:
i) cumulative normal distribution function
ii) spot interest rate (implied zero coupon interest rate)
iii) implied forward rate
iv) self-calibrating interest rate process

2.a) You are in the Vancouver market for a house. Your effective all-in market borrowing rate for a 4 year term house mortgage from a chartered bank is 5.65%. One of the houses you are considering purchasing has an assumable $625,000, 4 year mortgage at 4.25%, with a 22 year amortization. The asking price on the house is $800,000. What is the value of the concessionary financing for this house?

b) You are about the retire at age 65 and expect to achieve a 4% return on your invested capital over the full length of your retirement. What level of initial investment capital do you require to ensure a $70,000 per year income until age 100?

3. Show that the geometric series is a special case of a Taylor series. (Hint: set the initial value for the x variable equal to zero when expanding the function in a Taylor series). Explain how to expand the function:

$$f[x] = \frac{1}{1 - x}$$

where the Taylor series is evaluated with an initial starting x value of ¼.