SIMON FRASER UNIVERSITY
Faculty of Business Administration

Midterm Examination

BUS 417 13-1
Security Analysis

Rules for Submission: Answers to questions are to be typed, single spaced, of maximum length 1 page **each** for all questions in Part I, 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.) There is a half page constraint for Part II, Question 2b). There is no page constraint for other sections of Part II. Violations will be subject to deductions. Assignments are due in class, Wed., Mar. 13, 2013. 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. 1. a) Discuss the early history of life contingency valuation, from Roman times to the 18th century. Be sure to discuss: the role of life contingencies in municipal and state finance; and, the role of religion in determining the method of security contracting.
b) 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.

2.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." Is it true that "the cost of a higher convexity is a lower yield"? Using a multivariate Taylor series expansion of the bond price function $P[y, t]$, derive an expression for the tradeoff between time value and convexity. What are the limitations of this solution?

3. 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. How does option adjusted spread analysis 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) Describe the evolution of equity security analysis from 1900 to the present. In your answer be sure to identify seminal contributions to the different approaches to the subject and to provide an overview of the essential elements of these possible approaches.

PART II: NUMERICAL, MATHEMATICAL AND DEFINITIONS QUESTIONS
CHOOSE 2 of 3 (40 points total; 20 points per question; 10 points each for a) and b) parts)

1. a) Derive the Macaulay duration for: a perpetuity; a term annuity; and, a life annuity assuming arithmetically declining survival rates.
b) Using your solution from part a) and an interest rate of 3%, solve for the Macaulay duration of a life annuity for a 24 year old person that cannot live beyond 90 years. Verify your answer using a 'discrete' derivative.

2.a) You are in the Vancouver market for a house. Your effective all-in market borrowing rate for a 5 year term house mortgage from a chartered bank is 4.35%. The vendor of the house you are considering purchasing is willing to take back a $525,000, 5 year due-on-sale mortgage at 3.00%, with a 25 year amortization. The asking price on the house is $700,000. What is the value of the concessionary financing for this house?
b) Define the following:
i) spot interest rate (implied zero coupon interest rate)
ii) implied forward rate
iii) self-calibrating interest rate process

3.a) You are about the retire at age 60 and expect to achieve a 3.5% return on your invested capital over the full length of your retirement. What level of initial investment capital do you require to ensure a $90,000 per year income until age 95 when your capital will be exhausted? If you start your retirement with $2 million dollars, plan to have income of $80,000 per year and expect to achieve a 3% return on invested capital, how many years will pass before your funds are exhausted? How does your answer change if the expected return is 4%? Derive the functional relationship between changes in interest rates and the time that will pass before funds will be exhausted.
b) Show that the geometric series is a special case of a Taylor series.