SIMON FRASER UNIVERSITY
Faculty of Business Administration

Revised Sample Final Questions

BUS 316
Derivative Securities

1.) There will be a question with definitions of terms, e.g., warrants, riskless hedge portfolio, cumulative normal distribution function. This question will also include a problem requiring a few expiration date profit diagrams to be calculated from actual option prices, e.g., given the prices for the 02 Aug IBM 70 call and put options, draw the expiration date profit diagram for a straddle. (This requires the appropriate values to be entered on the expiration date profit diagram for the exercise price, the breakeven point and relevant points on the vertical axis).

2.) "A call option benefits from increases in the stock price and these increases can be very large. A put option benefits from stock price declines, but the stock price can only fall to zero. Therefore, if we have a put and a call on the same stock with the same terms, the put must sell for less than the call." Do you agree or disagree? Explain making sure that you identify relevant restrictions on the underlying arbitrage.

3.) **Describe** the delta, gamma and theta for a put option.

4. a) A long stock position can be "protected" by buying a put. How can the payoff on this portfolio of a stock and option be replicated using "dynamic hedging" strategies involving portfolios which combine only stock and bond positions?

b) Describe the various forms of portfolio insurance. How would these various forms of portfolio insurance perform in the face of discontinuous movements in equity prices such as the October 1987 market break?

5.a) Use the Black-Scholes option pricing model to value the following European call option on a non-dividend paying stock. Be sure to state the formula and provide sufficient information about the calculations performed to arrive at the solution:

Current stock price: \$30 Exercise price: \$40 Time to expiration: 3 months
Risk free interest rate: 5% per year Variance of annual stock returns: 0.25

5.b) Suppose ó = .35, S(0) = \$100, X = \$100, r = .05 and t* = .5 (the option has six months to expiration). Assuming that the stock pays no dividends, calculate the Black-Scholes call and put option prices.

6.) Under what conditions will American call options on dividend paying stocks be exercised early? Explain why American calls on non-dividend paying stocks will not be exercised early.

7. You are currently in period 0. Consider the binomial option pricing model when the stock price is permitted to progress **two** periods into the future. The current (period 0) stock price is \$100. The stock price evolves by either rising 50% or dropping by 25% each period. The risk free interest rate for each period is 10%. Assume that a European call is written on this stock with exercise price X = \$120 and expiration date at the end of period 2.

a) What are all the possible values for the stock price at the end of the first period and at the end of the second period? (Hint: It would be easiest to write down the appropriate two-step binomial tree.)

b) Using the period 2 expiration date call option prices and stock prices, calculate the call option hedge ratio needed at end of the first period if the stock price increases in the first period. Calculate the call option hedge ratio needed at the end of the first period if the stock price declines in the first period. What are the call option prices applicable at the end of the first period?

c) Calculate the period 0 call option price.