SIMON FRASER UNIVERSITY
Beedie School of Business Administration
Takehome Final Examination

BUS 419 18-3
Advanced Derivative Securities

Rules for Submitting Final Exam: Answers to questions are to be typed (except for equations), single spaced, of length 1 page ***each*** for all questions, 8"x11" standard paper, with 1" margin and type point not less than 12. (This assignment is typed in 12 point.) For questions with multiple parts, answer all parts of the question. Violations will be subject to deductions. Assignment is due in my office no later than 3:30PM on Wed. Dec. 12, 2018.

DO ALL FOUR QUESTIONS (Do all parts of each question)

1. Compare and contrast the risk management practices for four firms from the in-class presentations: i) a financial firm, either Goldman-Sachs or RBC; ii) an airline that is primarily a commodity consumer; iii) a commodity producer in the oil and gas sector; and, iv) a food and beverage firm that both buys inputs and sells outputs. Be sure to identify and contrast the risk management techniques, risk reporting techniques; and, the amount and type of derivative security usage. In addition, provide an assessment of the risk management strategies.

2. a) Outline the continuous time derivation of the Black-Scholes option pricing model. What key assumptions are being made to derive the results?
b) What are the limitations of applying the model to actual options prices for: i) dividend paying stocks; and, ii) a different distributional assumption for stock prices?
c) State the delta, gamma and theta of: i) a long position in a vertical spread constructed with calls; ii) a short position in a butterfly spread constructed with puts.

3. 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? (Hint: Be sure to identify the difference between path dependent and path independent strategies.)
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 during: i) the October 1987 market break; and, ii) the collapse of Sept. 2008- March 2009?

4.a) **State the formulas** for the delta, gamma and theta for a **purchased** (long) position in a straddle spread (same X and T for put and call); a strip (2 puts and a call, same X for puts and same T for both put and calls); and a strangle spread (X for put less than for X call, same T). Use the parameters: $S = 100$; $r = 0.05$; $\sigma = 0.75$; $T = 0.5$
b) If each spread is constructed to be delta neutral and have the same initial value (the value of the positions, V^*, is the same), then calculate the relative gamma and theta of the spread positions and explain the reasons for the differences in the Greeks?