SIMON FRASER UNIVERSITY
Faculty of Business Administration

FINAL EXAMINATION (2 HOURS)

BUS 419 15-1
Advanced Derivative Securities

EXAM INSTRUCTIONS: Please record all answers in the examination book provided. Calculators with enhanced capabilities such as the ability to input executable programs or attach external drives, whether such drives are attached or not, are prohibited. Use of devices with communications abilities, such as cell phones, is prohibited. The exam is closed book, no books or other supplementary materials are permitted to be used during the examination.

REQUIRED QUESTION (40 points total; 10 points for each part)
a) Outline the continuous time derivation of the Black-Scholes option pricing model. What assumptions are being made to derive the results?
b) How is the Black-Scholes formula adjusted to price options for: i) dividend paying stocks; ii) futures and forward prices?
c) Under what conditions will American call options on dividend paying stocks be exercised early?
d) Explain the arbitrage transactions underlying the covered interest parity theorem. What assumptions are being made about both the execution of the arbitrage and the underlying securities? (Hint: Discuss the implications of executing the arbitrage trades with different money market securities).

CHOOSE TWO OF THREE: (30 points for each questions; answer all parts)
1. a) Derive a "closed-form" expression (i.e., a formula) for the risk-minimizing hedge ratio. In what sense is this ratio an optimal hedge ratio? How is your answer affected if the commodity being hedged is undetermined at the time the hedge is "put on", e.g., a wheat farmer hedging the expected income to be generated by a crop which has just been planted?
b) **Describe** the delta, gamma and theta for a vertical spread using puts.

2.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) Are forward prices unbiased predictors of future spot prices? [Hint: Assuming mean-variance agents, derive an expression for the optimal speculative position size.] What happens to this position as the sensitivity of the agent to risk diminishes? Based on this, what can you conclude about the equilibrium in a market dominated by risk-neutral speculators?

3.a) Describe the delta, gamma and theta for a **short** position in a straddle spread (same X and T for put and call); a strap (2 calls and a put, same X and T); and a strangle spread (X for put less than for call, same T).
b) If each spread is constructed to be delta neutral and have the same initial value (the V is the same), then what can be said about the relative gamma and theta of the spread positions?