BUS 419   13-1
Advanced Derivative Securities

Rules for Submitting Final Exam: Answers to questions are to be typed, 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 7PM on April 17, 2013.

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

1**.** a) Assuming the speculator has a mean-variance expected utility function, <u>derive</u> an expression for the optimal speculative position size. What happens to this position as the forecasting ability of the speculator diminishes? What can you conclude about the equilibrium in a forward market dominated by risk-neutral speculators? Are forward contract prices unbiased predictors of future spot prices?
b) Derive a "closed-form" expression for the optimal hedge ratio for a hedger with a mean-variance expected utility function. What happens to this position as the sensitivity of the hedger to risk diminishes? Under what conditions is the optimal hedge ratio also a risk-minimizing hedge ratio?

2. a) Outline the continuous time derivation of the Black-Scholes option pricing model. What 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) What is meant by the delta, gamma and theta of a long horizontal spread position in 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) **Describe** the delta, gamma and theta for a long 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?