The exam consists of two sections. The first section contains 6 multiple choice questions (30 points). Please circle clearly the appropriate response. The second section contains 8 short answer questions (70 points). The last question on the exam is a bonus question. You will not lose any points if you do not answer this question or if you answer it incorrectly. Please write your responses in the space provided on the exam. Your answers should be concise, yet complete. If you have any doubt about the content or meaning of a particular question during the exam, please ask me about it.

Good luck!

For your entertainment, some light bulb jokes pilfered from the “Jokes about economists and economics” web site (netec.wustl.edu/JokEc.html):

Q: How many economists does it take to change a light bulb?
A: All of them - one to screw in the bulb, and the rest to hold everything else constant.

Q: How many conservative economists does it take to change a light bulb?
A1: None. If it really needed changing, market forces would have caused it to happen.
A2: None. If the government would just leave it alone it would screw itself in.
A3: None. Because look, it’s getting brighter! It’s definitely getting brighter!!
A4: None. They’re all waiting for the invisible hand of the market to correct the lighting disequilibrium.

Q: How many MBAs does it take to change a light bulb?
A: Only one, if you hire me. I can actually change the light bulb by myself. As you can see from my resume, I’ve had extensive experience changing light bulbs in my previous positions. I am presently a teaching assistant for Light Bulb Management 646. My only weakness is that I have a compulsion for changing light bulbs in my spare time.

Q: How many investors does it take to change a light bulb?
A: None. The market has already discounted the change.

Q: How many Keynesian economists does it take to change a light bulb?
A: All of them. Because then you will generate employment, more consumption, shifting the aggregate demand curve to the right, ...
Section I: Multiple Choice - 30 points

1. According to Roll, the only testable hypothesis associated with the CAPM is
   a. the number of mean-variance efficient portfolios.
   b. the exact composition of the market portfolio.
   c. whether the market portfolio is mean-variance efficient.
   d. the SML relationship.
   e. none of the above.

2. Suppose that you own 20 shares of stock XYZ. The hedge ratio on stock XYZ’s call option is 0.40. To form a ∆ hedge, you should
   a. buy 50 calls.
   b. write 50 calls.
   c. buy 20 calls.
   d. write 20 calls.
   e. none of the above.

3. If a call option is “in-the-money,” this means that
   a. its strike price is smaller than the stock price.
   b. its strike price is greater than the stock price.
   c. its strike price is equal to the stock price.
   d. the call is underpriced since exercising it would generate a positive payoff.
   e. none of the above.

4. The difference between a futures contract and a forward contract is that
   a. a futures contract is a promise to buy and a forward contract is a promise to sell.
   b. a futures contract can be exercised at anytime while a forward can only be exercised at maturity.
   c. marking to market occurs with futures contracts but not with forward contracts.
   d. a and c.
   e. none of the above.

5. Current one year Tbill yields are about 5.2%, and the dividend yield on the S&P composite portfolio is about 1.9%. The closing level of the S&P 500 index on Dec. 1 was 1398. Based on these figures, the price of a one year futures contract on the S&P 500 index should be
   a. greater than 1398.
   b. greater than 1000, but less than 1398.
   c. equal to 1398.
   d. about 12.
   e. none of the above.

6. Suppose that you are a farmer and will have 100,000 bushels of corn to sell in the spring. Futures contracts cover 5000 bushels each. Suppose further that you have estimated the following relationship between the futures price changes (ΔP_f) and the stock price changes (ΔP_s): ΔP_s = α + βΔP_f + ε and have found β = 0.90. The futures position you should take is:
   a. sell 18 futures contracts.
   b. buy 18 futures contracts.
   c. sell 20 futures contracts.
   d. buy 20 futures contracts.
   e. cannot be determined since the hedge ratio implied by the basis risk has not been specified.
Section II: Short Answer - 70 points

1. What fundamental economic concept is Arbitrage Pricing Theory based upon? Explain this fundamental economic concept.

2. Why is APT such an extremely appealing model relative to the CAPM?

3. What is the put-call parity theorem? (You may specify the theorem or give the intuition behind the theorem.) (Hint: If you do not remember the theorem, it may help you to draw the payoffs to (1) buying stock and selling a call and (2) selling a put.)
4. The common stock of the P.U.T.T. Corporation has been trading in a narrow price range for the past month. You are convinced it is going to break far out of that range in the next three months. You do not know whether it will go up or down, however. A simple options strategy to exploit your conviction about the stock price’s future movements would be to invest in a straddle. Explain why. Include a payoff diagram as part of your answer. (Hint: a long straddle entails buying both a call and a put option.)

5. Explain thoroughly why a call option is “worth more alive than dead.” I.e., explain why it is almost never optimal to exercise an American call option prior to expiration. (Hint: part of what you need to do is show that $C > S - X$ where $C$ is the price of the call, $S$ is the current stock price, and $X$ is the strike price of the call. You can accomplish this by showing that if $C \geq S - X$, a profit opportunity exists. Consider the strategy of buying a call, selling stock, and lend an amount $X$.)
6. The value of an at-the-money option is zero. After all, if the strike price of the option is equal to the stock price, the option will not be exercised and its payoff is therefore equal to zero. \textit{Comment.}

7. Imagine that you were interested in trading put and call options on the S&P 500 portfolio, and you had access to historical daily returns to the S&P portfolio and to a spreadsheet that would calculate the value of the put and call options from the Black-Scholes model. Suppose you find an actual option price that differs from the Black-Scholes formula price. Is it likely that your discovery represents a profit opportunity? If yes, explain how you would exploit it. If no, explain what may have caused the deviation in prices.

8. Recently, a number of investment bankers have been selling a product called “portfolio insurance,” which uses put and call options or futures contracts on portfolios of stocks to hedge the risk of a large portfolio of stocks.

Demonstrate how futures contracts could be used to reduce the risk of the stock portfolio.
*Bonus:* “The recent growth of markets in financial futures contracts provides a wonderful source of information about how people think stock and bond prices will move in the future. For example, if the futures price of the S&P 500 futures contract is much below the current level of the index, this implies pessimism about the returns to stocks. On the other hand, if the S&P futures price is way above the current level of the index, the market must expect a bull market.” *Evaluate this statement.*