1. (15pts) For Question I to IV, choose *only* one answer and ***explain*** the rationale in one or two sentences.

I. (3pts) Which of the following contradicts the proposition that the stock market is weakly efficient?

* 1. An analyst is able to identify mispriced stocks by looking at stock charts.
  2. Mutual funds do not outperform the market on average.
  3. Some investors can earn abnormal profits.
  4. The autocorrelations of stock returns are not significantly different from zero.

II. (3pts) Which of the following would provide the strongest evidence *against* the semi-strong form of the efficient market theory?

1. Fundamental analysis does not help generate abnormal returns.
2. Technical analysis is worthless in identifying mispriced stocks.
3. Stock prices response to firms’ earnings announcements gradually.
4. Mutual fund managers do not beat the market on average.

III. (3pts) A random walk occurs when

a) Stock price changes are random but predictable.

b) Stock prices respond slowly to both new and old information.

c) Past information is useful in predicting future prices.

d) Future price changes are uncorrelated with past price changes.

IV. (3pts) Which of the following statements is true about the efficient market hypothesis?

a. It implies a rational market.

b. It implies that everyone makes zero profit from trading.

c. It implies perfect forecasting ability.

d. It implies that prices do not fluctuate.

V. (3pts) Mark thinks that there is an interesting paradox of the efficient market hypothesis. If the market believes that prices reflect all information, investors will stop seeking mispriced securities. This may lead to more mispriced stocks and more inefficiency. However, if the market believes that inefficiency still exists, the competition of trying to be the first to find mispriced securities will make markets more efficient. Do you agree with Mark? Why or why not? Please briefly comment.

1. (12pts) For the following scenarios, describe a hedging strategy using futures contracts. Discuss the reasons for your choice of contract.
2. A public utility is concerned about rising costs.
3. A corn farmer fears that this year’s harvest will be at record high levels across the country.
4. A natural gas producer believes there will be excess supply in the market this year.
5. A bank derives all its income from long-term, fixed-rate residential mortgages.
6. A stock mutual fund invests in large, blue-chip stocks and is concerned about a decline in the stock market.
7. A U.S. exporter of construction equipment has agreed to sell some cranes to a German construction firm. The U.S. firm will be paid in euros in three months.

Finally, comment on whether using option contracts in the above cases could be better. What are the pros and cons of using options?

1. (15pts) Mr. Weiss just bought a zero-coupon bond issued by Risky Corp. for $870, with $1000 face value and one year to mature. He believes that the market will be in expansion with probability 0.9 and in recession with probability 0.1. In the event of expansion, Risky Corp. can always repay the debt. In the event of recession, the company would fail to meet its debt obligation. The bondholders would recover nothing and completely lose their investment, should the firm default. A zero-coupon government bond with the same maturity and face value is selling at $952.38. Assume that the government never defaults. The expected value and the standard deviation of the return of the market portfolio are 15% and 30%, respectively. Risky Corp’s bond return has a correlation of 0.67 with the market portfolio return. Assume that interest is compounded annually.
   1. Suppose Mr. Weiss holds the bond to maturity. What will be his holding period return if Risky Corp. does not default? What will be his holding period return if the firm defaults?
   2. What is the expected return of the Risky Corp. bond? Is the bond risky or riskfree? Explain.
   3. What is the YTM of the government bond? Is this YTM the riskfree rate? Explain.
   4. Compare the expected return of the Risky Corp. bond with the riskfree rate. Would a risk-averse investor buy the Risky Corp. bond at $870? Explain.
   5. The standard deviation of the return of the Risky Corp. bond is 34.48%. What is the beta of the bond? What would be the equilibrium expected return of the Risky Corp. bond if the CAPM holds? Does Mr. Weiss overvalue or undervalue the bond relative to the CAPM?
   6. Suppose Mr. Weiss changes his mind and sells his Risky Corp. bond. He invests in a portfolio that allocates 50% of the money on the market portfolio, and the other 50% on the government bond. What are the expected value and the standard deviation of his portfolio return? Is his portfolio efficient? Explain.
2. (18pts) Suppose the price of gasoline per gallon is currently $5. The risk manager of Universe Airlines expects the price per gallon next year to be either $7 or $4 with equal probabilities. The company plans to buy 1 million gallons of gasoline in one year. The risk manager is concerned about future rising cost of gasoline and is considering using either futures or calls to hedge against the risk. Suppose the riskfree interest rate is 10% per annum.
3. What is the futures price of gasoline per gallon for delivery in one year?
4. What are the possible payoffs of the futures one year from now?
5. If calls are used, only the ones with the same exercise price as the futures price are available now. How much would it cost to buy the calls? What are the possible profits of the calls (the payoffs net of the call premium) one year from now?
6. Suppose the investors of the company are risk averse and their collective risk attitude can be described by log utility. Assume that the risk manager maximizes the expected utility of the company which is worth $20 million right now. Which hedging method is better, the futures or the calls?
7. (20pts) Consider a two-date binomial model. A company has both debt and equity in its capital structure. The value of the company is 100 at Date 0. At Date 1, it is equally like that the value of the company increases by 20% or decreases by 10%. The total promised amount to the debtholders is 100 at Date 1. The riskfree interest rate is 10%.
   1. What are the possible payoffs to the equityholders at date 1? What kind of financial product has the same payoffs? Please describe the detailed characteristics of the financial product.
   2. What are the possible payoffs to the bondholders at date 1? Are they riskfree? What kind of financial product/portfolio has the same payoffs? Please describe the detailed characteristics of the financial product/portfolio.
   3. What is the value of the debt at Date 0? What is the value of the equity at Date 0?
   4. Suppose the government announces that it guarantees the company’s payment to the debtholders. How much is the government guarantee worth?
   5. Now we extend the model to a three-date setting. At both Date 1 and Date 2, it is equally likely that the value of the company increases by 20% or decreases by 10%, as depicted in the graph below. Suppose there is an American put option written on the entire firm with strike price 100. What is the value of this American put at Date 0?

t=0

t=1

t=2

81

108

144

90

120

100

Value of the firm in a three-date setting.

Note: This applies to part (e) *only*.

1. (20pts) Trident Corporation is currently worth $1,000,000. Its current debt-to-value (D/V) ratio is 40%. The company is confident in meeting its debt obligation, and wants to introduce more debt to take advantage of the tax shield of interest payment. It is planning to repurchase part of the common stock by issuing more corporate debt. As a result, the firm’s debt value is expected to rise from $400,000 to $500,000. The cost of debt is 10 percent per year. Trident expects to have an EBIT of $200,000 per year in perpetuity. Trident’s tax rate is 50%.
2. What would be the market value of Trident Corporation if it were unlevered?

What would be the expected return on equity if Trident were an all-equity firm?

1. What is the expected return on the firm’s equity before the announcement of the stock repurchase plan?
2. What is the value of equity after the announcement of the stock repurchase plan? How much money do the equityholders expect to receive each year under the new capital structure? What is the expected return on the firm’s equity after the announcement?
3. How much does the value of the firm increase after the announcement? If the goal is to maximize the firm’s value, would you recommend the CEO of Trident to borrow as much as they can? Please explain your rationale. Ignore the cost of financial distress and agency cost.
4. Now we consider the downside of debt borrowing: cost of financial distress and agency cost. The more debt there is, the more costly it could be when the firm fails to meet its debt obligation. Suppose the firm expects to incur an *additional* cost of $40,000 for this $100,000 increase in leverage. If the goal is to maximize the firm’s value, would you recommend the CEO of Trident to proceed with this repurchase plan? Please explain your rationale.