Instructions. This exam is closed book and closed note. Scratch pages are not allowed. Write your answer in the space provided or in an equal space elsewhere. Spill-overs, illegibility, and unreasonably tiny writing are penalized.

1. What are the problems of using the internal rate of return to evaluate investment projects?

2. Suppose there are two stocks in the world, A and B. The expected returns of the two stocks are 9 percent and 17 percent, with standard deviations of 4 percent and 15 percent. The correlation coefficient of the two stocks is .3. What is the expected return and standard deviation of a portfolio 90 percent A and 10 percent B? Does a risk-averse investor consider this portfolio to be better than one that is 100 percent invested in stock A? Explain, of course.
3. In the Miller “clienteles” model, the leverage of an individual firm is irrelevant to the value of the firm, but the leverage of the market as a whole is determined by forces of supply and demand. Explain.

4. (a) A firm has debt with a market value of $100,000. It has 5,000 shares of stock outstanding at $30 a share. Required return on the equity of the firm is .20. The corporate tax rate is 34%, and the interest rate on debt is .08. There is no threat of financial distress. Under the Modigliani-Miller theory of valuation with corporate taxes, what would the value be if the firm were unlevered? Explain of course.

(b) What is the weighted average cost of capital for the firm?

(c) The rate of return on the stock of firm A is $R_S$. The rate of return of the market is $R_M$.

$$Cov(R_M R_S) = .36 \quad Var(R_M) = .24 \quad Var(R_S) = .49$$

What is the beta of the stock of firm A? ______________

In one sentence, what does beta mean? ______________
5. A firm is marketing a fashion accessory that either will or will not find a strong market. The cost of the marketing effort is $9300 (thousand). If the accessory is a marketing success, the project will yield a net cash flow of $3000 (thousand) at each time 1 to 10. If the accessory fails, the project will yield 0 in each of the next 10 years. The discount rate is ten percent. The managers can salvage $500 (thousand) from their marketing campaign if they abandon it at time 1, and they wonder whether this option is at all valuable. Compute the value of the option by answering the following questions.
(a) Display the base case (no option to abandon) cash flows and compute the NPV for them.
(b) Display the cash flow decision and event tree when the option is present. Compute the NPV of the project assuming that the firm will abandon or not, according to what is most valuable at time 1.
(c) Subtract (a) from (b) to find the value of the option to abandon. Explain why the option to abandon is a put option.

6. Consider a stock. Further consider a call option on the stock with strike price of 80 that expires in 5 weeks and a put option on the stock with strike price of 80 that also expires in 5 weeks. The safe rate of interest is zero. Ignore bid-ask spreads. Suppose that today the stock sells for 78, the put sells for 5, and the call sells for 2. At these prices, an arbitrage opportunity exists. Describe it in detail. (The relevant formula here is the one for put-call parity, that is \( S + P = X e^{-r(T-t)} + C \).)