

Mock exam

May 2, 2023

Part I - Multiple-choice

1. If the annual interest rate is 6%, what is the present value of a perpetual cash flow of 50 that starts 1 year from now?
 - (a) 833.33
 - (b) 834.54 (c) 837.60
 - (d) 937.25
2. If markets are efficient then:
 - (a) The market is always right
 - (b) There should be no autocorrelation in excess returns
 - (c) People cannot quickly get rich on the stock market
 - (d) Security prices do not adjust quickly and unbiasedly to new information
3. Bonds that do not regularly pay interest but only give one final payment at maturity are called:
 - (a) Income bonds
 - (b) Junk bonds
 - (c) Zero coupon bonds
 - (d) Convertible bonds
4. In a Modigliani-Miller world without taxes:
 - (a) The value of the firm increases with leverage
 - (b) The return on equity increases with leverage
 - (c) The return on debt increases with leverage

- (d) None of the above
5. Which of the following is an example of a way in which companies can create value by exploiting real options?
- (a) Optimally delaying or abandoning projects;
 - (b) Exercising in-the-money real option immediately;
 - (c) Acting to take on new projects, even if there is no costs to waiting
 - (d) Abandoning good projects in favor of newer projects
6. An unlevered firm expects earnings before interests and taxes of 5 millions. The tax rate is 40% and the market value is 18 millions. The stock has a $\beta = 1$, and the risk free rate is 6%. The risk premium is 9%. Management is considering the use of perpetual debt (the size of the firm would remain constant), but currently there is no debt. Which of the following statements is **True**.
- (a) The cost of equity is 15%
 - (b) WACC = 12%
 - (c) WACC = 13.5%
 - (d) The cost of equity is 12%
7. When valuing a European option using the binomial model, an increase in the real-world probability that the underlying will go up most likely implies that the current price of the option:
- (a) Decreases
 - (b) Depends whether it is a call or a put option
 - (c) Increases
 - (d) Remains unchanged
8. Consider the Black and Scholes model. Which of the following statements is true?
- (a) The price of the European call option increases with the strike price
 - (b) The price of the European call option decreases with the stock price
 - (c) The price of the European put option increases with the strike price
 - (d) The price of the European put option increases with the stock price

Part II - Open Questions

1. The current price of Ocean Corporation stock is 6. In each six-month period this stock price can either go up by 2.50 or go down by 2. The stock pays no dividends. The one-year risk-free interest rate is 5%.
 - (a) Fill in Ocean stock price movements in a two-period binomial tree below.
 - (b) Calculate the payoffs for a currently at the money one year call option on the Ocean stock in the last period below.
 - (c) Using the **one-period** Binomial Model, calculate the price of a one-year European put option on the Ocean stock with a strike price of 7. Use the replication procedure.

2. Consider the following 8 portfolios with expected return and standard deviation as follows:

	A	B	C	D	E	F	G	H
Expected return (%)	15	12.5	16	20	10	18	17	18
Standard deviation (%)	25	21	29	45	23	35	29	32

- (a) Five of these portfolios are efficient, and three are not. Which are inefficient ones, and why?
 - (b) Suppose you are prepared to tolerate a standard deviation of 25%. What is the maximum expected return you can achieve if you cannot borrow or lend?
 - (c) What is your optimal strategy if you can borrow or lend at 11% and are prepared to tolerate a standard deviation of 25%? What is the maximum expected return that you can achieve with this risk?
3. An investment portfolio consisting of stocks *AA* and *BB*. Expected return and standard deviation on the stocks in the coming year are 3% and 7%, respectively, for *AA* and 5% and 12%, respectively for *BB*. One is also considering whether to add stock *CC* to the portfolio. The asset *CC* has an expected return of 5% and a standard variation of 1.58%. Additionally, we assume that the correlation between the returns of assets *AA* and *BB* is 0.4, the correlation between *AA* and *CC* is -0.3, and the correlation between *BB* and *CC* is 0.2.
 - (a) If one invests equal amount in stocks *AA* and *BB* and do not invest in *CC*, what are the expected return and standard deviation of the portfolio?

- (b) If one invests 30%, 40% and 30% of the total portfolio investments in stocks *AA*, *BB* and *CC*, respectively, what will be the expected return and standard deviation of the portfolio?
 - (c) Should one add stock *CC* to the existing portfolio consisting only of stocks *AA* and *BB*? Give two reasons.
4. Consider a stock which is traded at a price of 240. the stock has an annual volatility of 25%. Call options on the stock with an exercise price of 250 and a time to maturity of one year are also traded. The risk-free interest rate is 6 percent. Calculate the price of the option and the correspondent delta.