Problem Set
PROBLEM SET: Derivatives

Exercise 1.
Call option [4]
A stock's current price is $160, and there are two possible prices that may occur next period: $150 or $175. The interest rate on risk-free investments is 6% per period.

1. Assume that a (European) call option exists on this stock having on exercise price of $155.
   (a) How could you form a portfolio based on the stock and the call so as to achieve a risk-free hedge?
   (b) Compute the price of the call.
2. Answer the above two questions if the exercise price was $180.

Exercise 2.
Explain the meanings of the following financial terms:
a. Option
b. Expiration date
c. Strike price
d. Call
e. Put

Exercise 3.
Explain the difference between a long position in a put and a short position in a call.

Exercise 4.
You own a call option on Intuit stock with a strike price of $40. The option will expire in exactly three months' time.
a. If the stock is trading at $55 in three months, what will be the payoff of the call?
b. If the stock is trading at $35 in three months, what will be the payoff of the call?
c. Draw a payoff diagram showing the value of the call at expiration as a function of the stock price at expiration.

Exercise 5.
You own a put option on Ford stock with a strike price of $10. The option will expire in exactly six months' time.
a. If the stock is trading at $8 in six months, what will be the payoff of the put?
b. If the stock is trading at $23 in six months, what will be the payoff of the put?
c. Draw a payoff diagram showing the value of the put at expiration as a function of the stock price at expiration.

Exercise 6.
You own a share of Costco stock. You are worried that its price will fall and would like to insure yourself against this possibility. How can you purchase insurance against this possibility?

Exercise 7.
You are watching the option quotes for your favorite stock, when suddenly there is a news announcement. Explain what type of news would lead to the following effects:
a. Call prices increase, and put prices fall.
b. Call prices fall, and put prices increase.
c. Both call and put prices increase.

Exercise 8.
Wesley Corp. stock is trading for $25/share. Wesley has 20 million shares outstanding and a market debt-equity ratio of 0.5. Wesley's debt is zero-coupon debt with a 5-year maturity and a yield to maturity of 10%.
a. Describe Wesley's equity as a call option. What is the maturity of the call option? What is the market value of the asset underlying this call option? What is the strike price of this call option?
b. Describe Wesley's debt using a call option.

c. Describe Wesley's debt using a put option.

Exercise 9.

The current price of Estelle Corporation stock is $25. In each of the next two years, this stock price will either go up by 20% or go down by 20%. The stock pays no dividends. The one-year risk-free interest rate is 6% and will remain constant. Using the Binomial Model, calculate the price of a one-year call option on Estelle stock with a strike price of $25.

Exercise 10.

Roslin Robotics stock has a volatility of 30% and a current stock price of $60 per share. Roslin pays no dividends. The risk-free interest is 5%. Determine the Black-Scholes value of a one-year, at-the-money call option on Roslin stock.

Exercise 11.

[1]

Which of the following statements is true?

A) Call options are issued by corporations and bought by investors.
B) Call options are issued by investors and bought by corporations.
C) Call options are issued by investors and bought by investors.
D) Put options are issued by corporations and bought by investors.
E) Both B and D.

Exercise 12.

[3]

An out-of-the-money call option is one that

A) has an exercise price below the current market price of the underlying security.
B) should not be exercised.
C) has an exercise price above the current market price of the underlying security.
D) Both A and B.
E) Both B and C.

Exercise 13.

[3]

A stock has both a call and a put option outstanding. The exercise price was set equal to the stock price. If the option were to expire now what would be the minimum value of the call and the put respectively?

A) (S_T - E); ≥ 0
B) 0; (S_T - E)
C) <0; >0
D) 0; 0
E) (E - S_T); (S_T - E)

Exercise 14.

[1]

A stock is selling for $31. There is a call option on the stock with an exercise price of $27. What is the approximate minimum value of the call option?

A) $ 0
B) $ 4
C) $27
D) $31
E) Cannot determine without knowing the time to expiration.