3. Explain how a protective put is like purchasing insurance on a stock.

4. Why is choosing an exercise price on a protective put like deciding which deductible to take on an insurance policy?

Questions and Problems

1. *Buying an at-the-money put has a greater return potential than buying an out-of-the-money put because it is more likely to be in-the-money.* Appraise this statement.

2. Suppose that you wish to buy stock and protect yourself against a downside movement in its price. You consider both a covered call and a protective put. What factors will affect your decision?

3. You have inherited some stock from a wealthy relative. The stock had poor performance recently, and analysts believe it has little growth potential. You would like to write calls against the stock; however, the will stipulates that you must agree not to sell it unless you need the funds for a personal financial emergency. How can you write covered calls and minimize the likelihood of exercise?

4. We briefly mentioned the synthetic call, which consists of stock and an equal number of puts. Assume that the combined value of the puts and stock exceeds the value of the actual call by less than the present value of the exercise price. Show how an arbitrage profit can be made. Note: Do not use the data from the chapter. Show your point as it was illustrated in the text for the synthetic put.

5. A short position in stock can be protected by holding a call option. Determine the profit equations for this position and identify the breakeven stock price at expiration and maximum and minimum profits.

6. A short stock can be protected by selling a put. Determine the profit equations for this position and identify the breakeven stock price at expiration and maximum and minimum profits.

7. Explain the advantages and disadvantages to a covered call writer of closing out the position prior to expiration.

8. Explain the considerations facing a covered call writer regarding the choice of exercise prices.

9. The three fundamental profit equations for call, puts, and stock are identified symbolically in this chapter as

$$\Pi = N_C[\text{Max}(0, S_T - X) - C]$$
$$\Pi = N_P[\text{Max}(0, X - S_T) - P]$$
$$\Pi = S_T - S_0.$$

Prepare a single graph showing both the long and short for each profit equation above. Assume the positions are held to maturity. Therefore, you need to produce a total of three graphs. Describe the relationship between the long and short for each profit equation. Also describe the relationship between the call graph and the put graph.

The following option prices were observed for a stock for July 6 of a particular year. Use this information in problems 10 through 15. Ignore dividends on the stock. The stock is priced at 165.13. The expirations are July 17, August 21, and October 16. The continuously compounded risk-free rates are 0.0503, 0.0535, and 0.0571, respectively. The standard deviation is 0.21. Assume that the options are European.

	Calls			Puts		
Strike	Jul	Aug	Oct	Jul	Aug	Oct
165	2.70	5.25	8.10	2.40	4.75	6.75
170	0.80	3.25	6.00	5.75	7.50	9.00

In problems 10 through 15, determine the profits for possible stock prices of 150, 155, 160, 165, 170, 175, and 180. Answer any other questions as requested. Note: Your Excel spreadsheet Stratlyz9e.xls will be useful here for obtaining graphs as requested, but it does not allow you to calculate the profits for several user-specified asset prices. It permits you to specify one asset price and a maximum and minimum. Use Stratlyz9e.xls to produce the graph for the range of prices from 150 to 180, but determine the profits for the prices of 150, 160, ..., 180 by hand for positions held to expiration. For positions closed prior to expiration, use the spreadsheet BSMbin9e.xls to determine the option price when the position is closed; then calculate the profit by hand.

10. Buy one August 165 call contract. Hold it until the options expire. Determine the profits and graph the results. Then identify the breakeven stock price at expiration. What is the maximum possible loss on this transaction?

11. Repeat problem 10, but close the position on August 1. Use the spreadsheet to find the profits for the possible stock prices on August 1. Generate

a graph and use it to identify the approximate breakeven stock price.

12. Buy one October 165 put contract. Hold it until the options expire. Determine the profits and graph the results. Identify the breakeven stock price at expiration. What are the maximum possible gain and loss on this transaction?

13. Buy 100 shares of stock and write one October 170 call contract. Hold the position until expiration. Determine the profits and graph the results. Identify the breakeven stock price at expiration, the maximum profit, and the maximum loss.

14. Repeat the previous problem, but close the position on September 1. Use the spreadsheet to find the profits for the possible stock prices on September 1. Generate a graph and use it to approximate the breakeven stock price.

15. Buy 100 shares of stock and buy one August 165 put contract. Hold the position until expiration. Determine the profits and graph the results. Determine the breakeven stock price at expiration, the maximum profit, and the maximum loss.

For problems 16, 17, and 18, determine the profit from the following basic foreign currency option transactions for each of the following spot rates at expiration: $0.90, $0.95, $1.00, $1.05, and $1.10. Construct a profit graph. Find the breakeven spot rate at expiration. Assume that each contract covers 100,000 euros.

16. A call option on the euro expiring in six months has an exercise price of $1.00 and is priced at $0.0385. Construct a simple long position in the call.

17. A euro put with an exercise price of $1.00 is priced at $0.0435. Construct a simple long position in the put.

18. Use the information in problem 16 to construct a euro covered call. Assume that the spot rate at the start is $0.9825.

19. The Black-Scholes-Merton option pricing model assumes that stock price changes are lognormally distributed. Show graphically how this distribution changes when an investor is long the stock and short the call.

20. The Black-Scholes-Merton option pricing model assumes that stock price changes are lognormally distributed. Show graphically how this distribution changes when an investor is long the stock and long the put.

21. Using BSMbin9e.xls, compute the call and put prices for a stock option, where the current stock price is $100, the exercise price is $100, the risk-free interest rate is 5 percent (continuously compounded), the volatility is 30 percent, and the time to expiration is one year. Explain how you would create a synthetic call option and identify the cost.

22. Suppose the call price is $14.20 and the put price is $9.30 for stock options where the exercise price is $100, the risk-free interest rate is 5 percent (continuously compounded), and the time to expiration is one year. Explain how you would create a synthetic stock position and identify the cost. Suppose you observe a $100 stock price; identify any arbitrage opportunities.

23. (Concept Problem) In each case examined in this chapter and in the preceding problems, we did not account for the interest on funds invested. One useful way to observe the effect of interest is to look at a conversion or a reverse conversion. Evaluate the August 165 puts and calls and recommend a conversion or a reverse conversion. Determine the profit from the transaction if the options are held to expiration. Make sure that the profit properly accounts for the interest that accrues over the holding period.

24. (Concept Problem) Another consideration in evaluating option strategies is the effect of transaction costs. Suppose that purchases and sales of an option incur a brokerage commission of 1 percent of the option's value. Purchases and sales of a share of stock incur a brokerage commission of 0.5 percent of the stock's value. If the option is exercised, there is a transaction cost on the purchase or sale of the stock. Determine the profit equations for the following strategies assuming that the options are held to expiration and exercised if in-the-money rather than sold back. Assume that one option and/or share is used and that any shares left in the portfolio are sold.
    a. Long call
    b. Long put
    c. Covered call
    d. Protective put

25. (Concept Problem) Suppose an investor is considering buying one of two call options on a particular stock with the same maturity. The only difference between the two call options is the strike prices. The rate of return on a call option is its profit divided by the investment (the call price here). Identify the terminal stock price where the profits on the two long call positions are the same. Also identify the terminal stock price where the rates of return on the two long call positions are the same (but are not both −100%). Discuss the difference in these two terminal stock prices.