

LO.a: Determine the value at expiration, the profit, maximum profit, maximum loss, breakeven underlying price at expiration, and payoff graph of the strategies of buying and selling calls and puts and determine the potential outcomes for investors using these strategies.

1. Consider a call option selling for \$5 in which the exercise price is \$50 and the price of the underlying is \$48. If the price of the underlying at expiration is \$53, the value at expiration and the profit to the buyer is:
 - A. \$2 and \$3 respectively.
 - B. \$3 and -\$2 respectively.
 - C. \$3 and \$2 respectively.
2. Analyst 1: The maximum profit from buying a call is infinite and the maximum loss is the option premium.
Analyst 2: The maximum profit from buying a put is infinite and the maximum loss is the option premium.
Which analyst's statement is *most likely* correct?
 - A. Analyst 1.
 - B. Analyst 2.
 - C. Both.

The following information relates to questions 3-6:

A call option with an exercise price of \$90 is selling for \$6. The price of the underlying is \$87.

3. The value at expiration for the buyer when the underlying is priced at \$92 is most likely to be:
 - A. \$2.
 - B. \$3.
 - C. \$5.
4. The profit at expiration for the buyer when the underlying is priced at \$94 is most likely to be:
 - A. -\$2.
 - B. \$0.
 - C. \$2.
5. The value at expiration for the seller when the underlying is priced at \$93 is most likely to be:
 - A. -\$3.
 - B. \$0.
 - C. \$3.
6. The value at expiration for the seller when the underlying is priced at \$82 is most likely to be:
 - A. -\$3.
 - B. \$0.

- C. \$3.
7. Consider a call option selling for \$5 in which the exercise price is \$50 and the price of the underlying is \$48. If the price of the underlying at expiration is \$47, the value at expiration and the profit to the buyer is:
- A. \$0 and -\$5 respectively.
 - B. \$3 and \$2 respectively.
 - C. \$0 and -\$8 respectively.
8. Consider a call option selling for \$5 in which the exercise price is \$50 and the price of the underlying is \$48. If the price of the underlying at expiration is \$41, the value at expiration and the profit to the seller is:
- A. \$0 and \$2 respectively.
 - B. \$0 and \$9 respectively.
 - C. \$0 and \$5 respectively.
9. Consider a call option selling for \$5 in which the exercise price is \$50 and the price of the underlying is \$48. If the price of the underlying at expiration is \$51, the value at expiration and the profit to the seller is:
- A. \$0 and \$1 respectively.
 - B. \$1 and -\$4 respectively.
 - C. -\$1 and \$4 respectively.
10. Consider a call option selling for \$10 in which the exercise price is \$100 and the price of the underlying is \$96. The maximum profit to the buyer and the maximum profit to the seller is:
- A. ∞ and \$10 respectively.
 - B. \$10 and ∞ respectively.
 - C. \$96 and \$4 respectively.
11. Consider a call option selling for \$5 in which the exercise price is \$50 and the price of the underlying is \$48. The breakeven price of the underlying at expiration is closest to:
- A. \$48.
 - B. \$53.
 - C. \$55.
12. The exercise price for a call option is \$65, the price of the underlying is \$70, and the option is selling for \$6. Which of the following is most likely to be the breakeven price of the option?
- A. \$64.
 - B. \$71.
 - C. \$76.

The following information relates to questions 13-16:

A put option with an exercise price of \$100 is selling for \$8. The price of the underlying is \$103.

13. The value at expiration for the buyer when the underlying is priced at \$98 is most likely to be:
- A. \$2.
 - B. \$3.
 - C. \$5.
14. The profit at expiration for the buyer when the underlying is priced at \$102 is most likely to be:
- A. -\$1.
 - B. -\$2.
 - C. -\$8.
15. The maximum profit to the seller is most likely to be:
- A. \$8.
 - B. \$100.
 - C. \$108.
16. The breakeven price of the underlying at expiration is most likely to be:
- A. \$92.
 - B. \$98.
 - C. \$100.
17. Consider a put option selling for \$8 in which the exercise price is \$100 and the price of the underlying is \$102. If the price of the underlying at expiration is \$102, the value at expiration and the profit to a buyer is:
- A. \$0 and -\$8 respectively.
 - B. -\$8 and \$0 respectively.
 - C. \$0 and -\$2 respectively.
18. Consider a put option selling for \$4 in which the exercise price is \$50 and the price of the underlying is \$51. If the price of the underlying at expiration is \$45, the value at expiration and the profit to a buyer is:
- A. \$5 and -\$1 respectively.
 - B. \$5 and \$1 respectively.
 - C. \$1 and -\$5 respectively.
19. Consider a put option selling for \$8 in which the exercise price is \$100 and the price of the underlying is \$102. If the price of the underlying at expiration is \$91, the value at expiration and the profit to a seller is:
- A. \$9 and -\$1 respectively.
 - B. -\$9 and \$1 respectively.
 - C. -\$9 and -\$1 respectively.
20. Consider a put option selling for \$8 in which the exercise price is \$100 and the price of the underlying is \$102. If the price of the underlying at expiration is \$110, the value at expiration and the profit to a seller is:

- A. \$0 and \$8 respectively.
 - B. \$0 and \$10 respectively.
 - C. \$10 and \$0 respectively.
21. Consider a put option selling for \$8 in which the exercise price is \$100 and the price of the underlying is \$102. The maximum profit to a buyer and the maximum profit to a seller is:
- A. ∞ and \$100 respectively.
 - B. \$100 and \$8 respectively.
 - C. \$92 and \$8 respectively.
22. Consider a put option selling for \$8 in which the exercise price is \$100 and the price of the underlying is \$102. The breakeven price of the underlying at expiration is *closest* to:
- A. \$92.
 - B. \$100.
 - C. \$108.
23. Sam has £40,000 to invest; he believes that Apple's stock price will appreciate by £50 to £500 in three months. The three-month at-the-money put on one share of Apple costs £2.5, while the three-month at-the-money call costs £1.75. In order to profit from his view on Apple stock, he will *most likely*:
- A. buy calls on shares of Apple.
 - B. sell calls on shares of Apple.
 - C. sell puts on shares of Apple.

LO.b: Determine the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration, and payoff graph of a covered call strategy and a protective put strategy, and explain the risk management application of each strategy.

24. You simultaneously purchase a stock selling at \$57 and write a call option on it with an exercise price of \$65 selling at \$7. This position is commonly called a:
- A. fiduciary call.
 - B. covered call.
 - C. protective put.
25. An analyst has the following data and wishes to execute the covered call strategy on an option:
Stock price at $t = 0$ is \$82; strike price = \$84; call premium = \$3. Which of the following is *most likely* to be the breakeven for this position?
- A. \$79.
 - B. \$81.
 - C. \$87.

The following information relates to questions 26-27

Given that a bond is selling for \$97 with a face value of \$100 and a call option is selling for \$4 with an exercise price of \$103.

26. For a covered call and assuming that the price of the bond at expiration is \$90, the profit is *most likely* to be:
- A. -\$3.
 - B. \$6.
 - C. \$10.
27. The breakeven bond price at expiration is *most likely* to be:
- A. \$86.
 - B. \$93.
 - C. \$99.

The following information relates to questions 28-30

A put option, selling for \$0.08, has an exercise price of \$0.80. A hypothetical currency is selling for \$0.75.

28. Given that the price of the currency at expiration is \$0.85, for a protective put, the value at expiration is *most likely* to be:
- A. \$0.75.
 - B. \$0.85.
 - C. \$0.90.
29. Given that the price of the currency at expiration is \$0.87, for a protective put, the profit at expiration is *most likely* to be:
- A. \$0.04.
 - B. \$0.08.
 - C. \$0.10.
30. The maximum loss for the protective put is *most likely* to be:
- A. ∞ .
 - B. \$0.03.
 - C. \$0.08.
31. You simultaneously purchase a stock selling at \$57 and write a call option on it with an exercise price of \$65 selling at \$7. If the stock price is \$70 at expiration, the value at expiration and the profit for your strategy is:
- A. \$60 and \$10 respectively.
 - B. \$65 and \$15 respectively.
 - C. \$70 and \$20 respectively.
32. What is the maximum profit on a covered call position where the stock price at $t = 0$ is 50, the option premium is 4 and the exercise price is 51?
- A. 3.
 - B. 4.
 - C. 5.

33. You simultaneously purchase a stock selling at \$95 and write a call option on it with an exercise price of \$100 selling at \$9. If the stock price is \$87 at expiration, the value at expiration and the profit for your strategy is:
- A. \$100 and \$9 respectively.
 - B. \$87 and -\$1 respectively.
 - C. \$87 and \$1 respectively.
34. You simultaneously purchase a stock selling at \$57 and write a call option on it with an exercise price of \$65 selling at \$7. The maximum profit for your strategy is *closest* to:
- A. \$15.
 - B. \$7.
 - C. \$8.
35. You simultaneously purchase a stock selling at \$57 and write a call option on it with an exercise price of \$65 selling at \$7. The maximum loss for your strategy is *closest* to:
- A. \$65.
 - B. \$57.
 - C. \$50.
36. You simultaneously purchase a stock selling at \$57 and write a call option on it with an exercise price of \$65 selling at \$7. The breakeven stock price at expiration for your strategy is:
- A. \$65.
 - B. \$50.
 - C. \$57.
37. Suppose you simultaneously purchase a stock selling at \$98 and buy a put with an exercise price of \$100 and selling at \$5. This position is commonly called a:
- A. covered put.
 - B. protective put.
 - C. covered call.
38. What is the maximum loss on a protective put where the stock price at $t = 0$ is \$50, the option premium is 4 and the exercise price is 49?
- A. 3.
 - B. 4.
 - C. 5.
39. Suppose you simultaneously purchase a stock for \$49 and a put for \$4 with an exercise price of \$50. If the stock price is \$60 at expiration, the value at expiration and the profit for your strategy are:
- A. \$60 and \$7 respectively.
 - B. \$50 and \$4 respectively.
 - C. \$49 and \$11 respectively.
40. Which of the following statements is *least accurate*?

- A. The breakeven underlying price at expiration for a covered call is the original price of the underlying minus the option premium.
 - B. The breakeven underlying price at expiration for a protective put is the original price of the underlying plus the option premium.
 - C. The maximum profit for a covered call is the exercise price minus the original underlying price minus the option premium.
41. Suppose you simultaneously purchase a stock for \$98 and a put for \$5 with an exercise price of \$100. If the stock price is \$90 at expiration, the value at expiration and the profit for your strategy is:
- A. \$90 and \$5 respectively.
 - B. \$100 and -\$3 respectively.
 - C. \$90 and -\$8 respectively.
42. Suppose you simultaneously purchase a stock selling at \$98 and buy a put on it, with an exercise price of \$100 and selling at \$5. The maximum profit of your strategy is *closest* to:
- A. \$100.
 - B. \$198.
 - C. ∞ .
43. Suppose you simultaneously purchase a stock selling at \$98 and buy a put on it, with an exercise price of \$100 and selling at \$5. The maximum loss of your strategy is *closest* to:
- A. \$3.
 - B. \$5.
 - C. \$8.
44. Suppose you simultaneously purchase a stock selling at \$98 and buy a put on it, with an exercise price of \$100 and selling at \$5. The breakeven stock price for your strategy is *closest* to:
- A. \$100.
 - B. \$103.
 - C. \$105.
45. You write a covered call with a strike price of \$40. The call premium is \$2. The underlying stock is currently selling for \$36. What is the profit range at expiration?
- A. -\$36 to \$42.
 - B. -\$34 to \$6.
 - C. \$6 to infinity.

Solutions

1. B is correct. Value at expiration = $c_T = \max(0, S_T - X) = \max(0, 53 - 50) = \3 .
Profit to buyer = $c_T - c_0 = 3 - 5 = -\$2$.
2. A is correct. The maximum profit from buying a put is the exercise price minus the option premium, and the maximum loss is the option premium.
3. A is correct.
Value at expiration = $c_T = \max(0, S_T - X) = \max(0, 92 - 90) = 2$.
4. A is correct.
Value at expiration = $c_T = \max(0, S_T - X) = \max(0, 94 - 90) = 4$.
Profit = $c_T - c_0 = 4 - 6 = -2$
5. A is correct.
Value at expiration = $-c_T = -\max(0, S_T - X) = -\max(0, 93 - 90) = -3$
6. B is correct.
Value at expiration = $-c_T = -\max(0, S_T - X) = \max(0, 82 - 90) = 0$.
7. A is correct. Value at expiration = $c_T = \max(0, S_T - X) = \max(0, 47 - 50) = \0 .
Profit to buyer = $c_T - c_0 = 0 - 5 = -\$5$.
8. C is correct. Value at expiration = $-c_T = -\max(0, S_T - X) = -\max(0, 41 - 50) = \0 .
Profit to seller = $-c_T + c_0 = 0 + 5 = \$5$.
9. C is correct. Value at expiration = $-c_T = -\max(0, S_T - X) = -\max(0, 51 - 50) = -\1 .
Profit to seller = $-c_T + c_0 = -1 + 5 = \$4$.
10. A is correct. The maximum profit to the buyer is ∞ and the maximum profit to the seller is the option premium i.e. \$10.
11. C is correct. The breakeven price = $X + C_0 = 50 + 5 = \$55$.
12. B is correct.
Breakeven price, $S_T^* = X + c_0 = 65 + 6 = \71 .
13. A is correct.
Value at expiration = $p_T = \max(0, X - S_T) = (0, 100 - 98) = 2$.
14. C is correct.
Value at expiration = $p_T = \max(0, X - S_T) = \max(0, 100 - 102) = 0$.
Profit = $p_T - p_0 = 0 - 8 = -8$.

15. A is correct.

Maximum profit to the seller = $p_0 = \$8$.

16. A is correct.

Breakeven price, $S_T^* = X - p_0 = 100 - 8 = 92$

17. A is correct. Value at expiration = $p_T = \max(0, X - S_T) = \max(0, 100 - 102) = 0$.

Profit to the buyer = $p_T - p_0 = 0 - 8 = -\$8$.

18. B is correct. Value at expiration = $p_T = \max(0, X - S_T) = \max(0, 50 - 45) = \5 .

Profit to the buyer = $p_T - p_0 = 5 - 4 = \$1$.

19. C is correct. Value at expiration = $-p_T = -\max(0, X - S_T) = -\max(0, 100 - 91) = -\9 .

Profit to the seller = $-p_T + p_0 = -9 + 8 = -\$1$.

20. A is correct. Value at expiration = $-p_T = -\max(0, X - S_T) = -\max(0, 100 - 110) = \0 .

Profit to the seller = $-p_T + p_0 = 0 + 8 = \$8$.

21. C is correct. The maximum profit to the buyer is $X - p_0 = 100 - 8 = \$92$.

The maximum profit to a seller is $p_0 = \$8$.

22. A is correct. The break-even price is $X - p_0 = \$100 - \$8 = \$92$.

23. A is correct. Buying a call gives Sam the right to buy Apple's stock at the exercise price. He predicts that the stock will increase to £500 at the end of three months. He will likely be able to sell his calls for at least £50 and realize a profit.

24. B is correct. This position is commonly called a covered call.

25. A is correct. Break even = Stock price – Call premium

Therefore, the breakeven for this position equals $\$82 - \$3 = \$79$.

26. A is correct.

$V_T = S_T - \max(0, S_T - X) = 90 - \max(0, 90 - 103) = 90 - 0 = 90$

Profit = $V_T - V_0 = V_T - (S_0 - c_0) = 90 - (97 - 4) = -3$

27. B is correct.

Breakeven price, $S_T = S_0 - c_0 = 97 - 4 = 93$.

28. B is correct.

$V_T = S_T + \max(0, X - S_T) = 0.85 + \max(0, 0.8 - 0.85) = 0.85$.

29. A is correct.

$V_T = S_T + \max(0, X - S_T) = 0.87 + \max(0, 0.8 - 0.87) = 0.87$

$$\text{Profit} = V_T - V_0 = V_T - (S_0 + p_0) = 0.87 - (0.75 + 0.08) = 0.04.$$

30. B is correct.

$$\text{Maximum loss} = S_0 + p_0 - X = 0.75 + 0.08 - 0.80 = 0.03.$$

31. B is correct. The value at expiration is $V_T = S_T - \max(0, S_T - X) = 70 - \max(0, 70 - 65) = 70 - 5 = 65$.

$$\text{The profit on the position is } V_T - V_0 = 65 - (S_0 - c_0) = 65 - (57 - 7) = 65 - 50 = 15.$$

32. C is correct. Maximum profit is $X - S_0 + c = 51 - 50 + 4 = 5$.

33. C is correct. The value at expiration is $V_T = S_T - \max(0, S_T - X) = 87 - \max(0, 87 - 100) = 87$

$$\text{The profit on the position is } V_T - V_0 = 87 - (S_0 - c_0) = 87 - (95 - 9) = 1.$$

34. A is correct. The maximum profit $= X - S_0 + c_0 = 65 - 57 + 7 = 15$.

35. C is correct. The maximum loss $= S_0 - c_0 = 57 - 7 = 50$.

36. B is correct. Breakeven price $= S_0 - c_0 = 57 - 7 = 50$.

37. B is correct. This position is commonly called a protective put.

38. C is correct. Maximum loss is given by $S_0 + p_0 - X = 50 + 4 - 49 = 5$.

39. A is correct.

$$\text{Value at expiration} = V_T = S_T + \max(0, X - S_T) = 60 + \max(0, 50 - 60) = 60. \text{ The profit is } V_T - V_0 = 60 - (S_0 + p_0) = 60 - (49 + 4) = 7.$$

40. C is correct. The maximum profit for a covered call is the exercise price minus the original underlying price plus the option premium.

41. B is correct. The value at expiration $= V_T = S_T + \max(0, X - S_T) = 90 + \max(0, 100 - 90) = 100$. The profit is $V_T - V_0 = 100 - (S_0 + p_0) = 100 - (98 + 5) = -3$.

42. C is correct. The maximum profit for a protective put is ∞ .

43. A is correct. The maximum loss for a protective put $= S_0 + p_0 - X = 98 + 5 - 100 = 3$.

44. B is correct. The breakeven price $= S_0 + p_0 = 98 + 5 = 103$.

45. B is correct.

$$\text{The maximum loss is } \$36 - \$2 = \$34.$$

$$\text{The maximum profit is } (\$40 - \$36) + \$2 = \$6$$

If the price were to fall to zero, the investor would lose \$34.

If the price rises, the maximum profit of \$6 is earned.