

**LO.a: Explain how the concepts of arbitrage, replication, and risk neutrality are used in pricing derivatives.**

1. The spot price of an asset that has no interim costs or benefits will be *least likely* affected by:
  - A. the risk aversion of investors.
  - B. the time value of money.
  - C. the price recently paid by other investors.
2. Which of the following is *least likely* a benefit of holding an asset?
  - A. Convenience yield.
  - B. Dividends or interest payments.
  - C. A positive forecast for the asset.
3. Which of the following statements is *most* accurate?
  - A. An arbitrage opportunity is an opportunity to buy an asset at less than its fundamental value.
  - B. An arbitrage opportunity is an opportunity to make a profit at no risk with no capital invested.
  - C. An arbitrage opportunity is to earn the risk free rate.
4. If an arbitrage opportunity exists the:
  - A. prices will adjust to eliminate the opportunity.
  - B. risk premiums will increase.
  - C. markets will cease operations.
5. An arbitrage opportunity is *most likely* to be exploited when:
  - A. the price differential between assets is large.
  - B. the price differential between assets is minor.
  - C. the investor can only execute a transaction in small volumes.
6. An arbitrageur will *least likely* execute a trade when:
  - A. transaction costs are low.
  - B. prices reflect the law of one price.
  - C. offsetting positions are very liquid.
7. An arbitrage transaction is *most likely* to generate a profit when:
  - A. two portfolios produce identical results and sell for the same price.
  - B. two portfolios produce identical results but sell for different prices.
  - C. two portfolios produce different results and sell for different prices.
8. Which of the following statements regarding pricing of derivatives is *most accurate*?
  - A. A hedge portfolio is formed that eliminates arbitrage opportunities.
  - B. The payoff of the underlying is adjusted upward by the derivative value.
  - C. The expected future payoff of the derivative is discounted at the risk-free rate plus a risk premium.

9. Risk neutral investors:
- A. give away a risk premium because they enjoy taking risk.
  - B. expect a risk premium to compensate for the risk.
  - C. require no premium to compensate for assuming risk.
10. Which of the following statements is *least accurate*?
- A. Clearinghouses restrict the transactions that can be arbitrated.
  - B. Pricing models show what the price of the derivative should be.
  - C. It may not always be possible to raise sufficient capital to engage in arbitrage.
11. The interest rate used in the pricing of forward contracts:
- A. increases with the risk aversion of an investor.
  - B. decreases with the risk aversion of an investor.
  - C. is not impacted by the risk aversion of an investor.

**LO.b: Distinguish between value and price of forward and futures contracts.**

12. Which of the following statements about a forward contract is *most accurate*?
- A. The forward price is fixed at the start, and the value starts at zero and then changes.
  - B. The value is fixed at the start, and the forward price starts at zero and then changes.
  - C. The price determines the profit to the buyer and the value determines the profit to the seller.
13. Rabia and Saman, two CFA candidates, make the following statements about an asset which neither pays interest nor dividend. Also, there are no storage costs associated with the asset.  
Rabia: Just before termination, the value of a forward contract on that asset is zero.  
Saman: At initiation, the price of a forward contract on that asset is greater than the value of the contract.  
Which of the following is correct?
- A. Only Rabia is correct.
  - B. Only Saman is correct.
  - C. Both Rabia and Saman are incorrect.
14. Ali, a CFA candidate, makes the following statements:  
Statement I: Price of a forward contract fluctuates due to changes in market conditions  
Statement II: Value of a forward contract fluctuates due to changes in market conditions  
Which of the following is correct?
- A. Only Statement I is correct.
  - B. Only Statement II is correct.
  - C. Both statements are correct.

**LO.c: Explain how the value and price of a forward contract are determined at expiration, during the life of the contract, and at initiation.**

15. The value of the forward contract at expiration is equal to the:

- A. price of the underlying divided by the forward price.
  - B. price of the underlying minus the forward price.
  - C. price of the underlying minus the compounded forward price.
16. The price of a forward contract is decided:
- A. at initiation of the contract.
  - B. at expiration of the contract.
  - C. during the period of the contract.
17. A portfolio manager is required to buy 25,000 shares of Biz Corp. in a month. She fears that the price will rise during the coming month, so she contacts a dealer and enters into an equity forward contract to buy 25,000 shares of Biz Corp. at \$20 a share. When the contract expires, the price is \$22 per share. At expiration who benefits and by how much?
- A. Portfolio manager benefits by \$50,000.
  - B. Dealer benefits by \$500,000.
  - C. Dealer benefits by \$50,000.
18. NIT fund manager is required to sell 35,000 shares of NRL in three months. He is concerned the price of NRL shares will decline during the 3-month period, so he enters into a deliverable equity forward contract with HBL to sell 35,000 shares of NRL in three months for PKR 250 per share. When the contract expires, NRL is trading at PKR 200 per share. The fund manager will *most likely*:
- A. Pay PKR 7,000,000 to HBL.
  - B. Receive PKR 8,750,000 from HBL.
  - C. Receive PKR 1,750,000 from HBL.
19. NIT fund manager is required to sell 35,000 shares of NRL in three months. He is concerned the price of NRL shares will decline during the 3-month period, so he enters into an equity forward contract with HBL to sell 35,000 shares of NRL in three months for PKR 250 per share. When the contract expires, NRL is trading at PKR 200 per share. The fund manager will *most likely*:
- A. Pay PKR 7,000,000 to HBL.
  - B. Receive PKR 8,750,000 from HBL.
  - C. Receive PKR 1,750,000 from HBL.
20. Analyst 1: The value of a forward prior to expiration is the value of the asset minus the forward price.  
Analyst 2: The value of a forward prior to expiration is the value of the asset minus the present value of the forward price.  
Which analyst's statement is most likely correct?
- A. Analyst 1.
  - B. Analyst 2.
  - C. Neither of them.

**LO.d: Describe monetary and nonmonetary benefits and costs associated with holding the underlying asset, and explain how they affect the value and price of a forward contract.**

21. The forward price is least likely affected by:
- A. the costs of holding the underlying.
  - B. dividends paid by the underlying.
  - C. how the investor feels about risk.
22. Which of the following factors increases the forward price of a commodity?
- A. Interest income.
  - B. Opportunity cost.
  - C. Convenience yield.
23. Which of the following statements about the price of a forward contract is most accurate?
- A. Costs incurred and benefits received by holding the underlying affect the forward price by raising and lowering it, respectively.
  - B. Costs incurred and benefits received by holding the underlying affect the forward price by lowering and raising it, respectively.
  - C. Costs incurred and benefits received by holding the underlying do not affect the forward price.
24. The short party of a forward contract is *most likely* expecting that the price of the underlying asset will:
- A. increase.
  - B. decrease.
  - C. not change.
25. Consider a forward contract where the underlying is the Indus Motor stock. The stock does not pay dividends and does not incur carrying costs during the term of the contract. The forward price is found by:
- A. adding the spot price to the risk-free rate over the life of the contract.
  - B. discounting the spot price at the risk-free rate over the life of the contract.
  - C. compounding the spot price at the risk-free rate over the life of the contract.
26. PSO and NRL stocks are currently priced at PKR 250 per share. Over the next year, PSO stock is expected to pay dividends whereas NRL stock is not expected to pay dividends. There are no carrying costs associated with holding either stock over the next year. Compared with PSO, the one-year forward price of NRL is *most likely*:
- A. lower.
  - B. higher.
  - C. the same.
27. For a given asset, the spot price is 100, the interest rate is 10%, the storage cost for one year is 5, and the benefit of holding the asset for one year is 2. The one-year forward contract will *most likely* be priced at:
- A. 113.
  - B. 115.
  - C. 118.

28. If the present value of a convenience yield exceeds the present value of its storage costs, then the commodity's forward price is *most likely*:
- A. less than the spot price discounted at the risk-free rate.
  - B. less than the spot price compounded at the risk-free rate.
  - C. higher than the spot price compounded at the risk-free rate.
29. Which of the following best describes the price of a forward contract?
- A. Spot price  $(1 + r)$  + future value of costs – future value of benefits.
  - B. Spot price  $(1 + r)$  – future value of costs + future value of benefits.
  - C. Spot price  $(1 + r)$  + future value of costs.

**LO.e: Define a forward rate agreement and describe its uses.**

30. The forward rate of an FRA is equal to the:
- A. spot rate implied by the term structure.
  - B. forward rate implied by the term structure.
  - C. rate on a zero-coupon bond of maturity equal to that of the forward contract.
31. Which of the following is *most likely* true about a 30-day FRA on 90-day Libor? The forward rate is calculated based on:
- A. 30-day and 60-day spot rates.
  - B. 30-day and 90-day spot rates.
  - C. 30-day and 120-day spot rates.

**LO.f: Explain why forward and futures prices differ.**

32. Ignoring the time value of money, the forward contract payoffs will be:
- A. larger than future contract payoffs.
  - B. smaller than future contract payoffs.
  - C. equal to the future contract payoffs.
33. If future prices are negatively correlated with interest rates:
- A. futures contracts are more desirable to holders of long position than are forwards.
  - B. forward contracts are more desirable to holders of long position than are futures.
  - C. both forward contracts and future contracts will be equally desirable.
34. If futures prices are positively correlated with interest rates, a long party:
- A. prefers futures contracts.
  - B. prefers forward contracts.
  - C. is indifferent between futures and forwards.
35. In contrast to a futures contract, a forward contract is:
- A. standardized.
  - B. less regulated.
  - C. initiated at a zero value.

36. When futures prices are negatively correlated with interest rates, which of the following is correct.
- A. Long prefers futures contracts.
  - B. Short prefer forward contracts.
  - C. Long prefers forward contracts.
37. The value of a futures contract is the:
- A. futures price minus the spot price.
  - B. present value of expected payoff at expiration.
  - C. accumulated gain since the previous settlement, which resets to zero upon settlement.
38. A trader takes a short position in 10 futures contracts at the start of Day 1. The futures price at this stage is \$82. The closing price on Day 1 is \$75. What amount is added or taken away from the trader's account?
- A. \$70 added to account.
  - B. \$70 taken away from account.
  - C. \$75 taken away from account.
39. Which of the following is *most likely* true with respect to forward and futures contracts?
- A. Credit risk is virtually non-existent for both types of contracts.
  - B. Both types of contracts can be executed between private parties.
  - C. Both forwards and futures can be classified as forward commitments.
40. Which of the following conditions will *most likely* make futures prices and forward prices equivalent?
- A. No correlation between interest rates and forward prices.
  - B. No correlation between interest rates and futures prices.
  - C. Forward prices and futures prices have the same volatility.

**LO.g: Explain how swap contracts are similar to but different from a series of forward contracts.**

41. Which of the following statements is *most accurate*?
- A. A swap is equivalent to a series of forward contracts, each created at the swap price.
  - B. A swap is equivalent to a series of long forward contracts, matched with short future contracts.
  - C. A swap is equivalent to a series of forward contracts, each created at their appropriate forward prices.

**LO.h: Distinguish between the value and price of swaps.**

42. If the present value of the payments in a forward contract or swap is not zero, then:
- A. the party receiving the lower present value must compensate the other party with a cash payment at the start.

- B. the party receiving the greater present value must compensate the other party with a cash payment at the start.
  - C. such a contract cannot legally be created.
43. At the initiation of the contract, the value of a swap typically is:
- A. zero.
  - B. positive.
  - C. negative.
44. At the initiation of the contract, price of a swap typically:
- A. is zero.
  - B. cannot be calculated.
  - C. is calculated through the principle of replication.
45. The principle of replication states that the valuation of a swap is the present value of the:
- A. underlying asset.
  - B. fixed and floating payments from the swap.
  - C. all the net cash flow payments from the swap.
46. Which of the following statements is *most likely* correct?
- A. For a correctly priced swap the price is the same as value.
  - B. The price of a swap increases if the price of the underlying increases.
  - C. The value of swap changes during the life of the swap.
47. Which of the following is *least likely* correct?
- A. The value of a swap is typically zero at initiation.
  - B. The value of a swap is the present value of the fixed payments during the life of the swap.
  - C. Swaps have multiple settlement dates.

**LO.i: Explain how the value of a European option is determined at expiration.**

48. At expiration, a European call option will be valuable if the exercise price is:
- A. less than the underlying price.
  - B. equal to the underlying price.
  - C. greater than the underlying price.

**LO.j: Explain the exercise value, time value, and moneyness of an option.**

49. Due to time value decay, as we move closer to expiration:
- A. a call option losses value.
  - B. a put option losses value.
  - C. both call and put option lose value.
50. Analyst 1: For options, the minimum value is the greater of zero or the difference between the underlying price and the present value of the exercise price, whereas the exercise value is

the maximum of zero and the appropriate difference between the underlying price and the exercise price.

Analyst 2: For options, the exercise value is the greater of zero or the difference between the underlying price and the present value of the exercise price, whereas the minimum value is the maximum of zero and the appropriate difference between the underlying price and the exercise price.

Which analyst's statement is *most likely* correct?

- A. Analyst 1.
- B. Analyst 2.
- C. Neither of them.

51. Which of the following is *most likely* to be the maximum price of a European put option at time,  $t$ ?

- A. The price of the underlying stock at time,  $t$ .
- B. The present value of the exercise price of the option.
- C. The exercise price of the option.

52. Party A is long call options while Party B is long put options for the same underlying stock. These options mature on July 20<sup>th</sup> and have an exercise price of \$15/share. The options are priced at \$3 each. Given that the stock price on July 20<sup>th</sup> was \$17.5/share, which of the following *most accurately* describes the moneyness of the two options:

	Call options	Put options
A	Out of the money	Out of the money
B	In the money	Out of the money
C	Out of the money	In the money

53. Fred has bought a put option, with an exercise price of \$40 and a current stock price of \$48. Which of the following *most accurately* gives the exercise value of the option and describes its moneyness?

	Exercise Value	Moneyness
A.	\$8	In-the-money
B.	\$40	In-the-money
C.	\$0	Out-of-the-money

54. As the expiration date approaches, the time value of an option:

- A. Increases.
- B. Decreases.
- C. Stays the same.

**LO.k: Identify the factors that determine the value of an option, and explain how each factor affects the value of an option.**

55. The value of a European option is *least likely* affected by:

- A. the volatility of the underlying.
- B. dividends or interest paid by the underlying.
- C. the percentage of the investor's assets invested in the option.



56. Which of the following factors will *least likely* reduce the value of a European call option?

- A. Less time to expiration.
- B. A higher stock price relative to the exercise price.
- C. Larger dividends paid by the stock during the life of the option.

57. Analyst 1: A European put may be worth less the longer the time to expiration because the cost of waiting to receive the exercise price is higher.

Analyst 2: A European put may be worth less the longer the time to expiration because the longer time to expiration means that the put is more likely to expire out-of-the-money.

Which analyst's statement is *most likely* correct?

- A. Analyst 1.
- B. Analyst 2.
- C. Neither of them.

58. The table below shows three European call options on the same underlying:

	Time to Expiration	Exercise Price
Option 1	1 month	50
Option 2	2 months	50
Option 3	2 months	53

The option with highest value is *most likely*:

- A. Option 1.
- B. Option 2.
- C. Option 3.

59. The value of a European put option on a dividend paying asset will *most likely* decrease if there is a:

- A. decrease in dividend payments.
- B. decrease in carrying costs.
- C. decrease in the risk free rate.

60. What is the *most likely* impact on the price of a call option if the risk-free rate increases? The option price will:

- A. increase.
- B. decrease.
- C. stay the same.

61. Assuming everything else constant, which of the following *best* describes changes that result in a decrease in the value of a put option?

	Risk Free Rate	Volatility
A.	Increase	Decrease
B.	Decrease	Decrease
C.	Decrease	Increase

62. Which of the following will *most likely* cause a European put option to be worth less?

- A. Decrease in the risk free rate.

- B. Decrease in the time to maturity.
  - C. Decrease in the price of the underlying.
63. American call and put options are written on the same underlying and both options have the same expiration date and exercise price. At expiration, it is possible that both options will have:
- A. the same value.
  - B. positive values.
  - C. negative values.
64. At expiration, an American call option will be valuable if the underlying price is:
- A. equal to the exercise price.
  - B. less than the exercise price.
  - C. greater than the exercise price.

**LO.l: Explain put–call parity for European options.**

65. According to put-call parity, which of the following relationships hold?
- A. The put price is always equal to the call price.
  - B. The put price minus the underlying price equals the call price minus the present value of the exercise price.
  - C. The put price plus the underlying price equals the call price plus the present value of the exercise price.
66. Analyst 1: The combination of a long asset, long put, and short call will result in a risk free position.  
Analyst 2: The combination of a long call, long put, and short asset will result in a risk free position.  
Which analyst's statement is *most likely* correct?
- A. Analyst 1.
  - B. Analyst 2.
  - C. Both.
67. Which of the following transactions is the equivalent of a synthetic long put position?
- A. Long call, short bond, long asset.
  - B. Short call, short bond, long asset.
  - C. Long call, long bond, short asset.

**LO.m: Explain put–call–forward parity for European options.**

68. According to put-call-forward parity, which of the following relationships hold?
- A. The put price plus the value of a risk-free bond with face value equal to the forward price equals the call price plus the value of a risk-free bond with face value equal to the exercise price.
  - B. The put price plus the value of a risk-free bond with face value equal to the exercise price equals the call price plus the value of a risk-free bond with face value equal to the forward price.

- C. The put price plus the value of a risk-free bond with face value equal to the forward price equals the call price minus the value of a risk-free bond with face value equal to the exercise price.

**LO.n: Explain how the value of an option is determined using a one-period binomial model.**

69. In a binomial model, the volatility of the underlying is directly represented by the:
- A. standard deviation of the underlying.
  - B. difference between the up and down factors.
  - C. ratio of the underlying value to the exercise price.
70. Which of the following statements is *most accurate*? In a binomial model:
- A. the price of an option will be high if the actual probabilities of the up and down moves are high.
  - B. the price of an option will be low if the actual probabilities of the up and down moves are high.
  - C. the actual probabilities of the up and down moves are irrelevant to pricing options.
71. Which of the following statements about the binomial option pricing formula is *most accurate*?
- A. The spot price is compounded at the risk-free rate minus the volatility premium.
  - B. The expected payoff is discounted at the risk-free rate plus a risk premium.
  - C. The expected payoff based on risk-neutral probabilities is discounted at the risk-free rate.

**LO.o: Explain under which circumstances the values of European and American options differ.**

72. American calls should be exercised early if:
- A. the underlying has reached its expected maximum price.
  - B. the underlying has a lower expected return than the risk free rate.
  - C. there is a dividend or other cash payment on the underlying.
73. All else equal, a stock paying dividends:
- A. discourages early exercise of a put.
  - B. encourages early exercise of a put.
  - C. has no effect on early exercise of a put.
74. Ali is long an in-the-money American call option on a dividend paying stock. Would he ever exercise this option early?
- A. No.
  - B. Yes, if dividend is high enough.
  - C. Yes, if it's time value is high enough.

**Solutions**

1. C is correct. The price recently paid by other investors is past information and does not affect the spot price.
2. C is correct. A positive forecast for the asset is not a benefit of holding an asset.
3. B is correct. An arbitrage opportunity is an opportunity to make a profit at no risk with no capital invested.
4. A is correct. When an arbitrage opportunity exists investors will trade quickly and prices will adjust to eliminate the opportunity.
5. A is correct. An arbitrage opportunity is more likely to be exploited when the price differential between assets is large or when large volume transactions can be executed.
6. B is correct. When the prices reflect law of one price, there is no arbitrage opportunity.
7. B is correct. If two portfolios produce identical results but sell for different prices, an arbitrageur can buy the portfolio with the lower price and sell the portfolio with the higher price, generating a net inflow of funds at the start of the holding period.
8. A is correct. A hedge portfolio is formed that eliminates arbitrage opportunities and implies a unique price for the derivative.
9. C is correct. Risk-neutral investors neither give nor receive a risk premium because they have no feelings about risk.
10. A is correct. Clearinghouses do not restrict arbitrage transactions.
11. C is correct. In the pricing of forward contracts the risk free rate is used. Hence the risk aversion of the investor does not matter.
12. A is correct. The forward price is fixed at the start, and the value starts at zero and then changes.
13. B is correct. The value of a forward contract at initiation is zero; therefore, the forward price is greater than the value of the forward contract at initiation. Just before termination, the value of the forward contract will be equal to the spot price minus the forward price.
14. B is correct. Only the value of the forward contract will adjust as market conditions change. The forward price is fixed at initiation of the contract.
15. B is correct. The holder of the forward contract gains the difference between the price of the underlying and the forward price.

16. A is correct. The price of a forward contract is decided at the initiation of the contract.
17. A is correct. Since the portfolio manager takes a long position and the price goes up, she benefits. The benefit is  $25,000 * (22 - 20) = 50,000$ .
18. B is correct. The fund manager entered into a contract to sell the stock to HBL at PKR 250 per share in 3 months' time.  $35,000 * \text{PKR } 250 = \text{PKR } 8,750,000$ . Option B is correct because it is a deliverable contract. If it was a cash settled contract, then option C would be correct.
19. C is correct. Since it is a cash settled contract, the fund manager will receive  $35,000 * \text{PKR } 250 - 200 = \text{PKR } 1,750,000$ . Option B is correct only if it is a deliverable contract.
20. B is correct. The value of a forward contract prior to expiration is the value of the asset minus the present value of the forward price.
21. C is correct. How the investor feels about risk is irrelevant, because the forward price is determined by arbitrage.
22. B is correct. The convenience yield and interest income are benefits of holding the asset which are subtracted from the compounded spot price and reduces the commodity's forward price. The opportunity cost is the risk-free rate, which increases the commodity's forward price.
23. A is correct. Costs incurred and benefits received by holding the underlying affect the forward price by raising and lowering it, respectively.
24. B is correct. The short party of a forward contract is most likely expecting that the price will go down. On the other hand, the long party is expecting that the price will go up.
25. C is correct. For a stock that neither receives benefits nor incurs carrying costs during the term of the contract, the forward price is found by compounding the spot price at the risk-free rate over the life of the contract.
26. B is correct. The forward price of each stock is found by compounding the spot price by the risk-free rate for the period and then subtracting the future value of any benefits and adding the future value of any costs. In the absence of any benefits or costs, the one-year forward prices of PSO and NRL should be equal. After subtracting the benefits related to PSO, the one-year forward price of PSO is lower than the one-year forward price of NRL.
27. A is correct. An asset's forward price is  $\text{spot} * (1 + r) + \text{costs} - \text{benefits} = 100 * 1.1 + 5 - 2 = 113$ .
28. B is correct. If the present value of convenience yield exceeds the present value of its storage costs, then the commodity's forward price is less than the spot price compounded at the risk-free rate.

29. A is correct. Costs increase the forward price and benefits reduce the forward price.
30. B is correct. FRAs are based on Libor, and they represent forward rates, not spot rates.
31. C is correct. This FRA expires in 30-days and is based on a 90-day loan which starts on day 30. The forward rate represents the rate which can be locked in today for a 90-day loan starting 30-days from today. This rate is calculated based on the 30-day spot rate and the 120-day spot rate.
32. C is correct. Forward payoffs occur all at expiration, whereas futures payoffs occur on a day-to-day basis but would equal forward payoffs ignoring interest.
33. B is correct. The reason is because rising prices lead to futures profits that are reinvested in periods of falling interest rates, and falling prices leads to losses that occur in periods of rising interest rates.
34. A is correct. If futures prices are positively correlated with interest rates, futures contracts are more desirable to holders of long positions than are forwards. This is because rising prices lead to future profits that are reinvested in periods of rising interest rates, and falling prices lead to losses that occur in periods of falling interest rates.
35. B is correct. In contrast to a futures contract, a forward contract is less regulated.
36. C is correct. When futures prices are negatively correlated with interest rates, long prefers forward contracts.
37. C is correct. Value accumulates from the previous settlement and goes to zero when distributed.
38. A is correct. The trader has a short position so the fall in price helps him. He will receive:  $(82 - 75) * 10 = \$70$ .
39. C is correct. Option A is incorrect because credit risk is virtually non-existent only for futures contracts. Option B is incorrect because only forward contracts are executed between private parties. Option C is correct.
40. B is correct. Forward prices and futures prices are equivalent when there is no correlation between futures prices and interest rates.
41. A is correct. Each implicit forward contract is said to be off-market, because it is created at the swap price, not the appropriate forward price, which would be the price created in the forward market.
42. B is correct. Such a contract can legally be created, but the party receiving the greater present value must compensate the other party with a cash payment at the start.

43. A is correct. At the initiation of the contract, typically value of a swap is zero.
44. C is correct. Price of a swap is calculated using principle of replication.
45. C is correct. The principal of replication states that the valuation of a swap is the present value of all the net cash flow payments from the swap.
46. C is correct. The price of a swap is established at the start of the swap and remains fixed. The value of a swap is typically zero at the start of the swap and changes during the life of the swap.
47. B is correct. Options A and C represent correct statements. The value of a swap is the present value of net cash flow payments from the swap.
48. A is correct. A European call option will be valuable at expiration if the exercise price is less than the underlying price.
49. C is correct. Both call and put option have time value that decays as the expiration approaches.
50. A is correct. To calculate minimum value, the exercise price is adjusted for the time value of money.
51. B is correct. The maximum price of a European put option is the present value of the exercise price of the option. The price of the underlying stock at time,  $t$ , is the maximum value for a European Call option. The exercise price of the option is the maximum value for an American put option.
52. B is correct. For an option to be in the money:  
Call option condition:  $\text{Stock price} - \text{Exercise price} > 0$   
 $17.5 - 15 = 2.5 > 0$   
Hence, payoff is \$2.5 and the call option is in the money.  
Put option condition:  $\text{Exercise price} - \text{stock price} > 0$   
 $15 - 17.5 = -2.5 < 0$   
Hence payoff is zero and the put option is out of the money.
53. C is correct. The option has an exercise value of \$0 because the stock price exceeds the exercise price and the option shall not be exercised by the investor. Thus, the option is out-of-the-money.
54. B is correct. As the expiration date approaches, the time value decreases and is zero at expiration.
55. C is correct. The investor's exposure to the option is not relevant to the price one should pay to buy or ask to sell the option.

56. B is correct. The higher the stock price and the lower the exercise price, the more valuable is the call.
57. A is correct. Although the longer time benefits the holder of the option, it also has a cost in that exercise of a longer-term put comes much later. Therefore, the receipt of the exercise price is delayed.
58. B is correct. Option 2 will most likely have the highest value because it has a longer time to expiration relative to Option 1 and a lower exercise price relative to Option 3.
59. A is correct. A decrease in dividends reduces the value of a put option. A decrease in carrying costs increases the value of a put option. A decrease in the risk free rate increases the value of a put option.
60. A is correct. If the risk-free rate increases the call option price increases.
61. A is correct. Lower volatility on the underlying decreases the option's value for both puts and calls. Increase in risk free rate increases the value of a call option but reduces the value of a put option.
62. B is correct. A decrease in the risk free rate will cause a put option to be worth more. A decrease in time to maturity will generally cause a put option to be worth less. A decrease in the price of the underlying will cause the put option price to increase. The best option is B.
63. A is correct. If the underlying has a value equal to the exercise price at expiration, both options will have zero value since they both have the same exercise price.
64. C is correct. At expiration, an American call option will be valuable if the underlying price is greater than the exercise price.
65. C is correct. The put and underlying make up a protective put, while the call and present value of the exercise price make up a fiduciary call.
66. A is correct. The combination of a long asset, long put, and short call is risk free because its payoffs produce a known cash flow of the value of the exercise price.
67. C is correct. Put-call parity is given by: long stock + long put = long call + long bond. Hence a synthetic put can be created as follows: long call + long bond – short stock.
68. A is correct. According to put-call-forward parity, the put price plus the value of a risk-free bond with face value equal to the forward price equals the call price plus the value of a risk-free bond with face value equal to the exercise price.
69. B is correct. The up and down factors express how high and how low the underlying can go. Standard deviation does not appear directly in the binomial model, although it is implicit.



70. C is correct. The actual probabilities of the up and down moves are irrelevant to pricing options.
71. C is correct. Risk-neutral probabilities are used, and discounting is at the risk-free rate.
72. C is correct. Cash payments on the underlying are the only reason to exercise American calls early.
73. A is correct. Dividends drive down the stock price when the dividend is paid. This characteristic discourages early exercise, because stock price declines are beneficial to holders of puts.
74. B is correct. A cash flow such as a dividend payment is required for an early exercise. However, a dividend payment does not guarantee early exercise. A dividend needs to be large enough to justify the early exercise.