

## Derivatives Sample Exam Questions

1. An investor enters into a forward contract to buy 4,000 barrels of oil in three months at \$80 a barrel. At the maturity of the contract, the spot price of oil is \$65 a barrel. The investor's payoff (gain/loss) from the forward contract is
  - A. A gain of \$60,000
  - B. A loss of \$60,000
  - C. A gain of \$260,000
  - D. A loss of \$260,000
  
2. A US-based exporter anticipated receiving 100 million Euros (EUR) in six months, and took a short forward position, locking-in an exchange rate of USD 1.38/EUR. If after six months, at maturity, the exporter calculates that he has made a profit of 2 million US Dollars from the hedging strategy, the spot exchange rate at maturity must be
  - A. USD 0.50/EUR
  - B. USD 1.36/EUR
  - C. USD 1.40/EUR
  - D. USD 2.00/EUR
  
3. A month ago, the price of an IBM stock was \$110 and its volatility was 28%. Today, its price is still \$110 but its volatility has gone up to 40%. If the one-month interest rate has not changed over the last month and IBM stock does not pay any dividends (i.e., there are no costs of carry,) then:
  - A. The one-month forward prices of IBM today equals the one-month forward price a month ago
  - B. The one-month forward price of IBM today is greater than the one-month forward prices a month ago by \$10
  - C. The one-month forward prices of IBM today is lower than the one-month forward price a month ago by \$10
  - D. The one-month forward price of IBM today is \$44
  
4. The replication method identifies the price of a USD/GBP forward rate as a function of
  - A. The spot USD/GBP exchange rate, the GBP interest rates, and the USD interest rates
  - B. The expected future USD/GBP exchange rate, the GBP interest rates, and the USD interest rates
  - C. The spot USD/GBP exchange rate and the volatility of the spot USD/GBP exchange rate
  - D. Only the spot USD/GBP exchange rate

5. Consider that the one-year Euro interest rate is greater than the US one-year interest rate. How does the one-year forward exchange rate (USD per EUR) compare to the spot exchange rate (USD per EUR)?
- A. The forward rate is larger than the spot rate
  - B. The forward rate is smaller than the spot rate
  - C. The forward rate is equal to the spot rate
  - D. There is not enough information to answer this question
6. An investor enters into a forward contract to buy 5,000 barrels of oil at \$80 a barrel in three months. Two months later, suppose that the one-month forward price of oil is \$83 a barrel, and the one-month interest rate is 0%. The value of the contract the investor holds after two months is
- A. -\$15,000
  - B. +\$15,000
  - C. +400,000
  - D. +\$415,000
7. An investor enters into a forward contract to purchase 100,000 shares of IBM stock in 2 months at prices of \$105 per share. After one month, the investor notes that the forward price for the same contract (which now has a one-month maturity) is \$103 per share. She also notes that the one-month discount factor is 0.993. The value of the forward contract held by the investor is
- A. -\$198,600.00
  - B. +\$198,600.00
  - C. +\$200,000.00
  - D. +\$201,409.90
8. A firm enters into a one-year forward contract to buy refined oil. To hedge itself, the firm simultaneously sells one-year futures contracts on crude oil. In which of the following scenarios might the firm come under cash flows pressure related to these contracts?
- A. Oil prices plummet a day before the maturity of the contracts
  - B. Oil prices skyrocket a day before the maturity of the contracts
  - C. Oil prices plummet a day after the firm enters the contracts
  - D. Oil prices skyrocket a day after the firm enters the contracts

9. Suppose your portfolio consists of a stock of Goldman Sachs (GS) and a put option on GS with a strike of \$105 and a maturity of a year. At maturity, the value of your portfolio must be
- A. Equal to or less than \$105
  - B. Equal to \$105
  - C. Equal to or greater than \$105
  - D. None of the above
10. A seller of a naked put option will want the value of the underlying asset to \_\_\_\_\_ and a buyer of a naked call option will want the value of the underlying asset to \_\_\_\_\_
- A. decrease, decrease
  - B. decrease, increase
  - C. increase, decrease
  - D. increase, increase
11. You sell an IBM call option for \$4. The strike price of the option is \$120, and the maturity is one year. At maturity, the price of the IBM stock is \$126. Your profit/loss over the entire transaction is:
- A. \$3 profit
  - B. \$2 loss
  - C. \$6 loss
  - D. \$4 profit
12. Which of the following statements is TRUE?
- A. The maximum possible loss to the buyer of a call option is unlimited
  - B. The maximum possible loss to the seller of a call option is unlimited
  - C. The maximum possible loss to the buyer of a put option is unlimited
  - D. The maximum possible loss to the seller of a put option is unlimited
13. If you expect the price of a stock to decrease and its volatility to increase, then the most appropriate strategy to use is a
- A. Long put
  - B. Short put
  - C. Long Call
  - D. Short call

14. Suppose you are short a call and long a put on the S&P 500 index with the *same* strike and *same* maturity. Then, you are essentially holding

**Hint:** Draw the payoff diagram of the portfolio and compare it to the alternatives below

- A. A long forward on the S&P 500 index
- B. A long straddle on the S&P 500 index
- C. A short forward on the S&P 500 index
- D. A short straddle on the S&P 500 index

15. I hold a long position in a call option on IBM stock. If the price of IBM goes down and its volatility goes up, then the value of my call option

- A. Increases
- B. Decreases
- C. Is unaffected
- D. Cannot be determined with the available information

16. An investor who holds a short call option on IBM stock is implicitly

- A. Bullish on direction and bearish on volatility
- B. Bearish on direction and bullish on volatility
- C. Bearish on direction and volatility
- D. Bullish on direction and volatility

## Derivatives Sample Question Answers

1. At maturity, the value of a long position in a forward is  $(S - K)$ , where  $S$  is the spot price at maturity and  $K$  is the delivery price. So, at maturity, the value of the forward is  $65 - 80 = -15$ . That is, the investor loses \$15 for each barrel. The total loss is  $15 \times 4000 = \$60,000$ . **Answer = B**
2. The exporter gained \$0.02 for each euro. Note that the exporter has a short position so his gain per euro is given by  $K - S$ . So we have  $K - S = 1.38 - S = 0.02$ , so  $S = \$1.36$ . **Answer = B**
3. The replication method identifies the forward price of a security as a function of the spot price, interest rates, and the cost of carrying the spot asset to maturity. In this case, since the spot price and interest rates remain the same and the cost of carrying is zero, the one-month forward price should remain the same. **Answer = A**
4. Recall that for the replication price for USD/GBP currency forward is:  
$$F = S \cdot \frac{PV(GBP\ 1)}{PV(USD\ 1)}$$
**Answer = A**
5. The replication price for USD/EUR currency forward is  
$$F = S \cdot \frac{PV(EUR\ 1)}{PV(USD\ 1)}$$
Since the Euro interest rate is greater than the US one-year interest rate,  $PV(EUR) < PV(USD)$ , and so  $F < S$ . **Answer = B**
6. The value of an existing long forward is  $PV(F - K)$ , where  $F$  is the current forward price, and  $K$  is the delivery price. In this case, the value is  $PV(F - K) \times 5,000 = (83 - 80) \times 5,000 = \$15,000$ . **Answer = B.**
7. The value of an existing long forward is  $PV(F - K)$ . In this case:  
 $PV(103-105) \times 100,000 = (993/1000) \times (103-105) \times 100,000 = -\$198,600$ . **Answer = A.**

8. Since the forward is settled only at the end of the contract and the futures are marked-to-market every day, the company will come under cash flow pressure if the price of oil were to increase sharply. However, a sharp increase a day before maturity will not be problematic, as the firm will cover the losses on the futures side by the cash-flow received on the forward side a day after. **Answer = D.**
9. This is a "protective put" strategy - the put option protects you against declines in the price of GS below 105. **Answer = C.**
10. The value of a put option increases as the price of the underlying decreases; therefore, the seller of the put option will want the value of the underlying to increase. In addition, the value of a long call position increases as the price of the underlying increases.  
**Answer = D.**
11. At maturity, the call option worth  $126 - 120 = \$6$ , thus, the seller of the call option pays \$6 to the buyer. At the inception of the contract, the seller of the call option received a premium of \$4. Therefore, overall, she incurs a loss of \$2. **Answer = B.**
12. While a put option cannot have a payoff more than the strike price, the maximum value of the call option at maturity is unlimited. **Answer = B.**
13. A long put position is bearish on direction but bullish on volatility.  
**Answer = A.**
14. Similarly to a short forward contract, a portfolio with a short call position and a long put position with the same strike and the same maturity has a linear and decreasing payoff as a function of the price of the underlying at maturity. **Answer = C.**
15. The price of a call option is increasing with the price of the underlying, and it is increasing with the volatility of the underlying. In this case, the price of the underlying decreases but its volatility increases. So, we have two conflicting effects on the price of the call option, and we do not have enough information to determinate which one dominates the other.  
**Answer = D.**
16. Taking a short position in both a call option and a put option is bearish on volatility. The value of a call option increases with the price of the underlying, so taking a short position in a call option is bearish on direction. **Answer = C.**