

Assumptions for all problems: Unless otherwise stated,

- (i) all stocks are non-dividend paying
- (ii) $K_1 < K_2 < K_3$
- (iii) a no-arbitrage assumption is in effect.

1. Determine which of the following positions represents a bull spread

- I. Long Put (K_1, T) + Short Put (K_2, T)
- II. Long Call (K_1, T) + Short Call (K_2, T)
- III. Short Call (K_1, T) + Long Put (K_2, T)

- A. I only
- B. II only
- C. III only
- D. I and II
- E. I and III

2. For a stock that is currently priced at 55, a 2-year call option on the stock, with a strike price of 50, is currently selling for 8.48. Using a 2% annual effective risk-free interest rate, determine the cost of a 2-year 50-strike put option on the stock.

3. On January 1, a stock currently selling for 100 has monthly dividends of 1 payable at the end of each month. The risk-free interest rate is 6% compounded monthly. Determine the 1-year forward price on the stock.

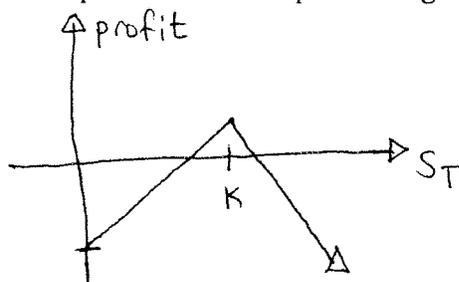
4. A stock is currently selling for 100. The risk-free interest rate is 4% annual effective. A 1-year forward contract on the stock is available with a forward price of 106. Determine which position creates arbitrage determine the amount of guaranteed profit.

- A. long stock + short forward; profit = 2
- B. short stock + long forward; profit = 2
- C. long stock + short forward; profit = 2.08
- D. short stock + long forward; profit = 2.08
- E. There is no arbitrage opportunity.

5. For a stock currently selling for 100 that has quarterly dividends of 1 with the next dividend due in 3 months, the prepaid forward price for a 1-year forward is 96.15. Determine the current risk-free interest rate as a nominal interest rate, compounded quarterly.

6. A certain stock is priced at 175. The stock pays annual dividends of 5 with then next dividend one year from today. The 2-year forward price on this stock is 180.33. Determine the annualized forward premium.
7. A certain stock, currently selling for 200 per share, pays dividends continuously at a rate of 2%. The risk-free interest rate is 3% compounded continuously. Determine the 1-year forward price on this stock.
8. A stock currently sells for 50 and the risk free interest rate is 3% compounded continuously. Determine the 3-year forward price for this stock.
9. An investor purchases a call option with an exercise price of 40 and at the same time sells a call option with a strike price of 50. Both options have the same time to expiration. Let X, Y, and Z denote the payoffs to this investor if the spot price of the underlying asset at expiration is 38, 48 and 58, respectively. Determine the sum $X+Y+Z$.

10. Determine the position whose profit diagram is



- A. Long Put (K,T) + Long Call (K,T)
 - B. Long Call (K,T) + Short Put (K,T)
 - C. Long Put (K,T) + Short Call (K,T)
 - D. Short Call (K,T) + Short Put (K,T)
 - E. None of the Above
11. An investor takes a covered call position using a 1-year call option with an exercise price of 60. The current price of the underlying asset is 55 and the call premium is 4. The risk-free interest rate is 2% compounded continuously. Let X denote the investor's profit if the spot price of the underlying asset in one year is 58, and let Y denote the investor's profit if the spot price of the underlying asset in one year is 62. Determine $Y - X$.

12. An investor buys an 80-100 zero-cost collar. I.e. the investor buys an 80-strike put option on a stock while at the same time selling a 100-strike call option on the stock, where both options have the same time to expirations and the put premium equals the call premium. The investor's profit is 20. Determine the spot price at expiration.

13. Order the following option types from most to least restrictive when it comes to exercising the option:

- I. European
- II. Bermudan
- III. American

- A. I, II, III
- B. I, III, II
- C. II, III, I
- D. III, II, I
- E. III, I, II

14. Determine which of the following statements is true:

- I. The risk of financial loss due to a stock market crash is diversifiable.
- II. The risk of financial loss due to a car wreck is non-diversifiable.
- III. The risk of financial loss due to a house fire is diversifiable.

- A. I only
- B. II only
- C. III only
- D. I and II
- E. I and III

15. A stock currently sells for 55. An investor uses 50-strike and 70-strike put options to enter into a 1-year bear spread on the stock. The 50-strike put costs 4 and the 70-strike put costs 18. The risk-free interest rate is 3% compounded continuously. Determine the investor's maximum loss on the position.

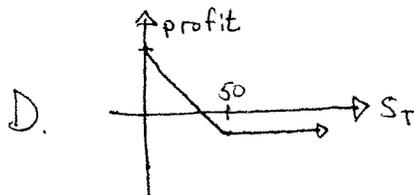
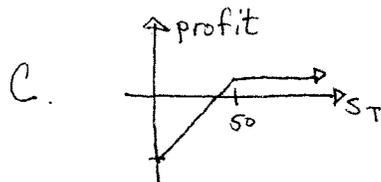
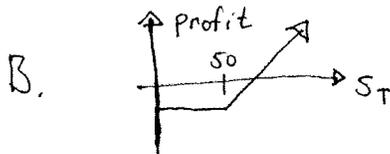
16. Determine which of the following statements is true:

- I. A forward contract has more credit risk than a futures contract.
- II. Futures contracts are traded over-the-counter.
- III. Futures contracts are liquid.

- A. I only
- B. II only
- C. III only
- D. I and II
- E. I and III

17. An investor purchases a 2-year 50-strike straddle with an initial cost of 5. The risk-free interest rate is 4% compounded continuously. Determine the investor's profit if the spot price of the underlying asset is 45.

18. Determine which is the profit diagram for a Floor (50,T) position.



E. None of the above

19. An investor sells a 20-25 strangle. Determine the investor's payoff if the spot price at expiration of the underlying asset is 27.
20. An investor enters into a cap position by shorting a stock and purchasing a call option on the stock with an exercise price of 50 and two years to expiration. The current stock price is 52, the call premium is 8, and the risk free interest rate is 2% annual effective. Determine the range of spot prices at expiration of the stock in order for the investor to lose more than 4 on this position.
21. A certain stock, currently selling for 20 per share, pays dividends continuously at a rate of 2%. The risk-free interest rate is 5% compounded continuously. Determine the cost-of-carry.
22. Determine which of the following statements is true:
- I. Long Put(30,T) + Short Put(50,T) + Short Call(50,T) + Long Call(60,T) is an asymmetric butterfly spread.
 - II. A ratio spread is achieved by buying m puts at one strike price and selling n puts at a different strike price.
 - III. A box spread is a synthetic bond position.
- A. I only
 - B. II only
 - C. III only
 - D. I and II
 - E. I and III
23. One-year, two-year, and three-year spot rates are 3%, 4%, and 5%, respectively. Payments of 1000, 4000, and 3000 are due at the end of years one, two, and three, respectively. Determine the swap price corresponding to this set of payments.
24. An investor uses 40-strike and 50-strike call options to enter into a 1-year bull spread on a stock. The 40-strike call costs 9 and the 50-strike call costs 3. The risk-free interest rate is 3% annual effective. Determine spot price of the stock in 1-year in order for the investor's profit on the position to be 0.
25. One-year, two-year, and three-year spot rates are 3%, 4%, and 5%, respectively. Determine the swap rate for a three-year interest rate swap.