1. A stock price is currently $100. Over each of the next two six-month periods it is expected to go up by 10% or down by 9%. The risk-free interest rate is 5%. What is the risk-neutral probability that the stock price will increase each period? (Report in % such as 12.34%.)
2. **Question 2**

Consider a 3-month European put option on a non-dividend-paying stock, where the stock price is $60, the strike price is $60, the risk-free rate is 3% per annum. Stock price will either move up by 10% or down by 5%, every month. Price the put with binomial trees.

|  |  |  |
| --- | --- | --- |
|  |  | $2.10 |
|  |  | $2.52 |
|  |  | $2.94 |
|  |  | $3.37 |

**Question 3**

Suppose your portfolio mirrors S&P500 index and is valued currently at $1,000,000. The S&P 500 index is currently at 2,000. What action is needed to provide protection against the value of the portfolio falling below $950,000 in 6 months?

|  |  |  |
| --- | --- | --- |
|  |  | Buy 1,000 6-month S&P500 put options with strike price of 1800. |
|  |  | Buy 500 6-month S&P500 put options with strike price of 1900. |
|  |  | Buy 1,000 6-month S&P500 put options with strike price of 1900. |
|  |  | Buy 500 6-month S&P500 put options with strike price of 1800. |

**Question 4**

Which of the following Greek letter measures the option value sensitivity to time?

|  |  |  |
| --- | --- | --- |
|  |  | Delta |
|  |  | Theta |
|  |  | Vega |
|  |  | Rho |

**Question 5**

Which is not a factor to the option price?

|  |  |  |
| --- | --- | --- |
|  |  | current stock price |
|  |  | strike price |
|  |  | expected return of stock |
|  |  | volatility of stock |
|  |  | risk-free interest rate |

**Question 6**

You are positive that the XYZ stock price will change a lot in the near future. But you are not certain about the direction of price change. Which strategy is the best to use in this scenario?

|  |  |  |
| --- | --- | --- |
|  |  | Bull spread |
|  |  | Bear spread |
|  |  | Butterfly spread |
|  |  | Straddle |

**Question 7**

A call with a strike price of $70 costs $7.38. A put with the same strike price and expiration date costs $3.56. If you create a straddle, what is the initial cash flow? If it's a cash outflow, answer in a negative number.



**Question 8**

Suppose that put options on a stock with strike prices $45 and $55 cost $4 and $9, respectively. Use these options to create a bear spread. At what stock price at maturity will you break even? In other words, at what stock price, will you make $0 profit?



Question 9

What is the implied volatility of 30-day options on the S&P 500 called?

|  |  |  |
| --- | --- | --- |
|  |  | VIX |
|  |  | Eurodollar futures |
|  |  | LIBOR |
|  |  | swaptions |

**Question 10**

One should use butterfly spread, if he thinks there will be a significant stock price move in either direction.

True

False

**Question 11**

Which of the following statements is correct about the early exercise of American options?

|  |  |  |
| --- | --- | --- |
|  |  | It is always optimal to exercise an American call option on a non-dividend-paying stock before the expiration date. |
|  |  | It can be optimal to exercise an American put option on a non-dividend-paying stock early. |
|  |  | It can be optimal to exercise an American call option on a non-dividend-paying stock early. |
|  |  | It is never optimal to exercise an American put option on a non-dividend-paying stock before the expiration date. |

**Question 12**

\_\_\_\_\_\_\_\_\_ is a CDO created from a pool of short credit default swaps.

|  |  |  |
| --- | --- | --- |
|  |  | ABS CDO |
|  |  | Credit default swap |
|  |  | Total return swap |
|  |  | synthetic CDO |

**Question 13**

A European call option and a European put option on a stock both have a strike price of $45 and expire in 6 months. Currently, the call price is $10 and the put price is $5 in the market. The risk-free rate is 2% per annum, and the current stock price is $50. Identify the arbitrage opportunity open to the trader. All the interest rates are with continuous compounding.

|  |  |  |
| --- | --- | --- |
|  |  | Buy call, sell put, sell stock |
|  |  | Buy call, sell put, buy stock |
|  |  | Sell call, buy put, buy stock |
|  |  | Sell call, buy put, sell stock |

**Question 14**

A call option expiring in 2 months has a market price of $10.75. The current stock price is $70, the strike price is $60, and the risk-free rate is 4% per annum. Calculate the implied volatility.

|  |  |  |
| --- | --- | --- |
|  |  | 20% |
|  |  | 25% |
|  |  | 30% |
|  |  | 35% |

**Question 15**

Currently the index is standing at 1,083. The risk-free rate is 4% per annum and the dividend yield is 1% per annum. A 6-month European put option on the index with a strike price of 1000 is trading at $34.94. What is the value of a 6-month European call option on the index with the same strike price?



Question 16

The following put-call parity holds for American options.

c + K e^(-rT) = p + S0

True

False

**Question 17**

Suppose the current stock price is $100. If the stock price increases soon, which action will provide the highest rate of return?

|  |  |  |
| --- | --- | --- |
|  |  | buy $100 call, buy $100 put |
|  |  | buy $95 call, short $105 call |
|  |  | short $95 call, buy $105 call |
|  |  | buy $100 call, short 2 units of $100 calls, buy $105 call |

### Question 18

Suppose you are creating a butterfly spread using call options with 3 different strike prices. Currently, the call price with strike price of $40 is $21.99, the call with strike price of $50 is $12.54, and the call with strike price of $60 is $6.32. What is the initial cash flow of the butterfly spread strategy? If it's a cash outflow, then answer in a negative number.

**Question 19**

Currently, a stock price is $80. It is known that at the end of 4 months it will be either $72 or $90. The risk-free rate is 6% per annum with continuous compounding. What is the value of a 4-month European put option with a strike price of $80?

Question 20

If the volatility is 30%, then the stock price will move up by 30% or down by 30% next period.

True

False

Question 21

The objective of hedging is to make more profits.

True

False

**Question 22**

Calculate the price of a 4-month European call option on a dividend-paying stock with a strike price of $30 when the current stock price is $32, the risk-free rate is 6% per annum and the volatility is 40% per annum. A dividend of $1.00 is expected in 2 months. Use Black-Scholes formula.

|  |  |  |
| --- | --- | --- |
|  |  | $3.05 |
|  |  | $3.65 |
|  |  | $4.32 |
|  |  | $5.02 |

Question 23

Suppose you receive 2,500,000 British Pounds (not Euros) today and plan to convert into US dollars early next February. Which is the correct action to take today in order to hedge against GBP exchange rate risk?

|  |  |  |
| --- | --- | --- |
|  |  | Short 20 British Pounds futures contracts expiring in February |
|  |  | Long 20 British Pounds futures contracts expiring in March |
|  |  | Short 40 British Pounds futures contracts expiring in March |
|  |  | Long 40 British Pounds futures contracts expiring in February |
| **Question 24** According to the put-call parity, the following condition must be met for the call price to be equal to the put price, when all the other factors are the same:

|  |  |  |
| --- | --- | --- |
|  |  | Both call and put must be American style option |
|  |  | Both options must meet the lower-bound and upper-bound conditions |
|  |  | Exercise price should be equal to forward price |
|  |  | Put-call parity means put price and call price are the same |

**Question 25** When comparing option hedging (hedging with options) to futures hedging (hedging with futures), which statement is most true:

|  |  |  |
| --- | --- | --- |
|  |  | Option hedging allows for smaller variability in the end value than futures hedging. |
|  |  | Futures hedging protects against downside risk but allows for upside potential. |
|  |  | Futures hedging is more expensive than option hedging because the latter is settled in cash. |
|  |  | Option hedging protects against downside risk but is typically more expensive than futures hedging. |

 |  |  |