

**Exercise Set 8**

1. Choose the correct answer(s):
   1. The price of a put option decreases with volatility.
   2. A European put option can be worth less than its intrinsic value
   3. The value of an American put option must be lower than or equal to the strike price.
   4. The price of a put option on a stock decreases with a decrease in the current stock price.
2. The price of a 2-year European call option on a non-dividend-paying stock that has a strike price of 10$ is 4$. The price of a put with the same strike and maturity date is 2$. The current stock price is 10$. The continuously-compounded risk-free interest rate is 3% per annum. Which of the following is true?
   1. Arbitrage is not possible.
   2. An arbitrage strategy involves buying the put, buying the call, and shorting the underlying asset.
   3. An arbitrage strategy involves buying the call and the underlying asset.
   4. An arbitrage strategy involves selling the put and shorting the underlying asset.
   5. An arbitrage strategy involves buying the put, selling the call, and buying the underlying asset.
3. Which of the following is/are true?
   1. The price of an option is always non-negative.
   2. The payoff of an options is always non-negative
   3. Physical delivery is always possible when trading option contracts.
   4. An option can deliver a positive payoff but a negative profit to the bearer.
4. Which of the following is/are true? Consider a European and an American option call on the same stock, with the same maturity and strike price. If the prices of both options are the same, then…
   1. It is necessarily the case that there is an arbitrage, as in any American Option.
   2. There isn’t necessarily an arbitrage opportunity.
   3. There is no arbitrage opportunity.
   4. There is an arbitrage opportunity, as long as the stock pays dividends earlier than the maturity of the option.
5. An investor with a straddle position is betting on…
   1. High volatility.
   2. Low volatility.
   3. Higher volatility than what is implied by option prices.
   4. Lower volatility than what is implied by option prices.
6. A stock, currently trading at 19£, has 120-days at-the-money European call options trading at 2£. The risk-free rate is 1%. What is the value of a European put option with the same maturity and strike price?
7. A stock has 6-months European call and put options, with a strike of 1900p trading at 150p and 50p, respectively. The stock is currently trading at 1954p. What is implicit risk-free interest rate?
8. Suppose you have two European call options on the same stock with the same price, but where one option matures in 3 months, while the other matures in 4 months. It is possible that the 3-month call is more valuable, if…
   1. The options are deep in-the-money and the interest rate is high enough.
   2. The options are deep out-of-the-money and the interest rate is high enough.
   3. The stock pays high enough dividends in 3.5 months’ time.
9. Draw the payoff graph of:
   1. a short straddle with a strike price of 285$;
   2. a bull call spread with strike prices of 325$ and 350$
   3. a long strangle with strike prices of 250$ and 350$
   4. a long butterfly call spread with strike prices of 250$, 275$ and 300$

The current price of a stock is 275$. Imagine you believe that investors in the market are overestimating short-term volatility. Which of the strategies in question 9 would you invest on?

1. What do you need to do in order to have a payoff structure as follows?



* 1. Buy one K=250 put, buy one K=250 call, sell two K=275 calls, buy two K=300 calls
  2. Buy two K=250 put, sell one K=275 put, buy one K=300 put, buy one K=300 call
  3. Buy one K=250 put, buy one K=250 call, sell one K=275 calls, buy two K=300 calls
  4. Buy one K=250 put, sell two K=275 put, buy one K=300 put, buy one K=300

1. I am long on 2 call option with strike price 45, short in 1 put with strike 40 and short in 1 call with strike 55. The underlying asset of all these options is stock XYZ which has a current market price of 54. What is my total payoff?
2. A put option on a stock is said to be out of the money if
   1. the exercise price is higher than the stock price.
   2. the exercise price is less than the stock price.
   3. the exercise price is equal to the stock price.
   4. the price of the put is higher than the price of the call.
   5. the price of the call is higher than the price of the put.