

AS251 Term 222

Exam II

Duration: 120 minutes

Name:

ID:

1. Only SOA approved calculators are allowed.
2. This exam has 8 questions.
3. Show all of your work. Points will be deducted for results without work.
4. Write clearly. Justify every step in the calculations. You may lose points just writing the equation or results.
5. No credits will be given to wrong steps.

1. You are given:

- i. The current stock price is 400.
- ii. The stock does not pay dividends.
- iii. The continuously compounded risk-free interest rate is 6%.
- iv. The price of one-year European call option with strike price K is 65.
- v. The price of one-year European put option with strike price K is 20.

Calculate the strike price K .

2. You are given:

- The spot exchange rate is $2\$/\pounds$.
- The continuously compounded risk free interest rate in dollars is 6%.
- The continuously compounded risk free interest rate in pounds is 2%.
- 6-month dollar denominated European put option on pounds with strike price $2\$/\pounds$ costs $\$0.04$.

Determine the premium in pounds 6-month pound-denominated European put option on dollars with strike price of $0.5\pounds/\$$.

3. You are given the following prices for European put options:

Strike Price	Put Premium
40	3
50	10

Determine the highest possible price for a European put option with strike price 42.

4. Which of the following statements are true?
- i) A longer lived American call option with a strike price increasing at the risk-free rate must be worth at least as much as a shorter-lived option.
 - ii) For two European call options on a non-dividend paying stock, the one with the shorter time to expiry must be worth at least as much as the other one.
 - iii) It is always irrational to exercise an American put option on a non-dividend paying stock early.
 - iv) An American option is worth at least its exercise value.
 - v) A European call option cannot be worth more than the prepaid forward price of the stock.
5. The future prices of a stock are modeled with a 1-period binomial tree based on forward prices, the period being 6 months.
- You are given:
- i. The price of the stock is 25.
 - ii. The European call option on the stock expiring in 6 months has strike price 24 .
 - iii. The volatility is 0.2.
 - iv. The stock pays continuous dividends at a rate of 3%.
 - v. The continuously compounded risk-free Interest rate is 5%.

Determine the number of shares in the replicating portfolio for the call option.

6. A non-dividend paying company stock is currently trading at 50. Over the next year, this stock will either increase by 10% or decrease by $x\%$. The effective annual interest rate is 4%. The value of a one year put option for this stock at an exercise price of 50 is 1.28. Calculate x .
7. The future prices of non-dividend paying stock are modeled with a 2-period binomial tree, with each period being one year. You are given:
- i. The tree is constructed based on forward prices.
 - ii. The stock's initial price is 50.
 - iii. The continuously compounded risk free rate is 6%.
 - iv. The volatility is 0.3.

An American put option on the stock with strike price 60 expires in 2 years. Determine the price of the put option.

8. An investor sells a 60-strike European call option and purchases a 45-strike put option. You are given:
- i. Stock prices change quarterly.
 - ii. The option matures in six months.
 - iii. The current stock price is 60.
 - iv. Each quarter, the stock price either increases or decreases by 20%.
 - v. The continuously compounded risk free interest rate is 5%.
 - vi. The stock pays no dividends.

Determine the initial cost of the collar.