

Problem Set 4

Instructions: This problem set is due on 5/5 at 11:59 pm CST and is an individual assignment. All problems must be handwritten. Scan your work and submit a PDF file.

Problem 1. A stock is currently for \$130. It is known that at the end of 6 months it will be either \$173 or \$98. The risk-free interest rate is 10% per annum with continuous compounding. What is the value of a 6-month European call option with a strike price of \$129? Use the replicating portfolio argument and indicate the number of shares required to hedge the position.

Problem 2. A stock price is currently \$70. It is known that at the end of 8 months it will be either \$89 or \$55. The risk-free interest rate is 5% per annum with continuous compounding. What is the value of an 8-month European put option with a strike price of \$70? Use the replicating portfolio argument and indicate the number of shares required to hedge the position.

Problem 3. A stock price is currently \$40. It is known that at the end of 4 months it will be either \$53 or \$30. The risk-free interest rate is 8% per annum with continuous compounding. What is the value of a 4-month European call option with a strike price of \$39? Use the risk-neutral probability method to compute the value of the option.

Problem 4. A stock price is currently \$50. It is known that at the end of 6 months it will be either \$69 or \$36. The risk-free interest rate is 10% per annum with continuous compounding. What is the value of a 6-month European put option with a strike price of \$50? Use the risk-neutral probability method to compute the value of the option.

Problem 5. The current price of a non-dividend paying stock is \$73. Over the next year, it is expected to go up or down by 12% or 10%, respectively. The risk-free rate is 8% per year with continuous compounding. A market-maker of an important investment bank just sold 100 at-the-money European call options (i.e. one contract) expiring in one year to an important client. How many shares of the stock does she need to buy in order to hedge her exposure?

Problem 6. The current price of a non-dividend paying stock is \$92. Over the next year, it is expected to go up or down by 14% or 12%, respectively. The risk-free rate is 8% per year with continuous compounding. A market-maker of an important investment bank just sold 100 at-the-money European put options (i.e. one contract) expiring in one year to an important client. How many shares of the stock does she need to sell in order to hedge her exposure?