Problem Set 7

 # 1: Suppose an investor paid a \$5 premium for a European put with a strike price of \$40. Under what circumstances should the option be exercised? If the spot price of the underlying asset is \$85 at expiry, how much does the investor profit or lose? What if it is \$10?

 # 2: Suppose an investor sells a European call with a strike price of \$60 for a premium of \$15. Under what circumstances would we expect the option to be exercised? If the underlying has a price of \$80, how much does the investor profit or lose? What if it is \$30.

 # 3: A bull spread is an option position involving taking a long position in a call with strike price K_1 and a short position in another call with a strike of K_2 where $K_2 > K_1$. Both calls have the same expiration date. Plot the payoff of a bull spread. Now suppose you implement a bull spread on a stock using strikes \$50 and \$80. What is the payoff if at expiration the stock price is \$20? \$60? \$90?

 # 4: Show that long call payoff

$$C(S(T),T) = \begin{cases} S(T) - K & \text{if } S(T) > K \\ 0 & \text{if } S(T) \leq K \end{cases}$$

is equivalent to

$$C(S(T),T) = \max\{0, S(T) - K\}$$

 # 5: Justify arbitrage inequality #2 for options:

$$P(t) \leq e^{-r(T-t)}K.$$

 # 6: Justify arbitrage inequality #4 for options:

$$P(t) \geq e^{-r(T-t)}K - S(t)$$

 # 7: Suppose there is a 3 month call on a stock with a strike price of \$50, currently priced at \$10. Suppose the underlying stock is currently trading at \$65. Suppose the risk free rate is 3%. Are there any arbitrage opportunites and if so how would you exploit them?

 # 8: Suppose there is a 6 month put on a stock with a strike price of $80, currently priced at $12. Suppose the underlying stock is currently trading at $60. Suppose the risk free rate is 6%. Are there any arbitrage opportunities and if so how would you exploit them?

 # 9: Suppose there is a 3 month call on a stock with a strike price of $60, currently priced at $35. Suppose the underlying stock is trading at $75 and that the risk free rate is 5%. Are there any arbitrage opportunites if a 3 month put with the same underlying and strike is currently trading at $10, and if so how would you exploit them?