Statistics C183/C283   **Instructor: Nicolas Christou**

Homework 7

Exercise 1
An investor sells a European call on a share for $4. The stock price is $47 and the exercise price is $50. When does the investor make a profit? When will the option be exercised? Use R to draw a diagram showing the investors profit against the price of the stock at expiration.

Exercise 2
An investor buys a European put on a share for $3. The stock price is $42 and the exercise price is $40. When does the investor make a profit? When will the option be exercised? Use R to draw a diagram showing the investors profit against the price of the stock at expiration.

Exercise 3
You want to purchase 2 puts and 1 call. The call option costs $5 and the put option costs $6. The exercise price for the call or the put is $50. Use R to plot the profit against the stock price at the expiration date:

   a. For the 2 puts.

   b. For the call.

   c. For the combination of the 2 puts and 1 call.

Exercise 4
Consider the following strategy: You write 2 call options (each one with $E = \$45, C = \$5$) and you buy 1 call option (with $E = \$40, C = \$8$). Both buying and selling call options have the same expiration date. Use R to plot the profit against the stock price at the expiration date for this strategy.

Exercise 5
By rearranging the put call parity equation $p + S_0 = c + Ee^{-rt}$ give an example in R to show the payoff and profit using the following investing strategies:

   a. Long put long stock.

   b. Short put short stock.

   c. Long call short stock.

   d. Short call long stock.

Exercise 6
Consider the box spread strategy: It is a combination of a bull call spread and a bear put spread.
Bull call spread: Buy one call with exercise $E_1 = \$50$ and sell one call with exercise $E_2 = \$60$.
Bear put spread: Buy one put with exercise $E_2 = \$60$ and sell one put with exercise $E_1 = \$50$.

   a. Complete the table that shows the payoffs for all the positions above.

   b. Construct the diagram in R that shows the payoff for the bull call spread, for the bear put spread, and the total.

Exercise 7
Consider creating a bear spread using puts: Sell one put with exercise E_1 and buy one put with exercise price E_2, with $E_2 > E_1$. Complete the table that shows the payoff and profit for each position and the total and use a numerical example in R to show the diagram for each position and the total.

Exercise 8
Consider creating a bear spread using call: Sell one call with exercise E_1 and buy one call with exercise price E_2, with $E_2 > E_1$. Complete the table that shows the payoff and profit for each position and the total and use a numerical example in R to show the diagram for each position and the total.