FM 5021
Hw6

1) Suppose that you are considering buying a 1-year \$100 call (this means $K = 100$) on S which is trading at \$100. If the interest rate for a year is $r = 1\%$

a) Find a lower bound for the price of the call.

b) If, in addition, you observe that the put with the same strike is worth \$1 how much do you expect to pay for the call?

2) We have proved the put-call parity relationship for European options (on non dividend paying stocks) in class. For American options the relationship is not valid. What holds is:

$$S - K \leq C - P \leq S - Ke^{-rT}$$

Hint: For the first inequality analyze the following portfolios:

Portfolio A: $C + K (= c + K)$.

Portfolio B: $P + S_0$.

For the second one start with put-cal parity for Europeans and use that $P > p$ and $C = c$.

3) By the way, we have also proved in class that American calls (if S does not pay dividends) should never be exercised early. Try working out the details yourself.

4) Suppose that c_1, c_2 and c_3 are the prices of European call options with strike K_1, K_2 and K_3 so that $K_1 < K_2 < K_3$ and $K_3 - K_2 = K_2 - K_1$. Prove that:

$$c_2 \leq .5\,(c_1 + c_3).$$

5) Use put-call parity to show that the cost of a butterfly spread (we described it in class) created from European calls is the same as the price of the same butterfly spread created from European puts.

6) Generalize the lower bounds for European calls and puts prices on stocks that pay no dividends to the case in which the stock pays a continuous dividend yield.