STA4020 Assignment 1

Due Date: Thursday, September 27, 2018

1. Consider this variant of a forward contract. In addition to the usual forward contract with maturity T on stock S, the party which promises to buy pays a premium $\$p$ to the seller at initiation of the contract (i.e., at time t). Determine, by arbitrage arguments, how the forward price K (the price agree to pay at time T) must be adjusted. Assume interest is constant and equal to r.

2. The present price of a stock is $S_0 = 50$. The market value of a European call with strike $K = 47.5$ and maturity $T = 180$ days is 4.375. The price of a zero-coupon bond with maturity 180 days is B(0, T) = 0.9948.

   (a) For a European put with a strike price of 47.5 you are quoted a price of 1.450. Is this consistent with put-call parity?

   (b) Describe how you can take advantage of this situation, by finding an arbitrage.

3. Prove the following bounds on European call options:

$$C \geq \max(S - Ke^{-r(T-t)}, 0)$$

   Here C is the price at time $t \leq T$ of an European call option with maturity at time T, on an underlying stock paying no dividends, and strike K.