Quiz Nine

1. True or False. An interest rate cap is equivalent to a portfolio of American put options on zero coupon bonds.

2. True or False. The Cox-Ingersoll-Ross short rate model incorporates mean reversion but has the downside that it can produce negative rates.

3. True or False. In a world risk neutral with respect to a zero coupon, the expected value of the forward rate starting at time $t$ and ending at time $t + \Delta t$ is the forward rate observed today.

4. True or False. Both the Vasicek and CIR short rate models can be calibrated using ordinary least squares.

5. Suppose a one year zero coupon bond is trading at $93 and a two year zero coupon bond is trading at $82, both with par value of $100.
   (a) Why don’t we have to clarify cash versus dirty/quoted price in this case?
   (b) What is the 1-year forward rate for the period starting in one year, $R(0, 1, 2)$?
   (c) What is the forward price of the two year zero coupon bond?
   (d) Use Black’s model to price a European call option on the two year bond with strike price of $85$ the volatility of the forward bond price is $20\%$. 