FM 5021
Midterm

Name:

Justify all your answers.

1) Assume that today is 1/1/2019. A trader is considering buying a bond that expires in 4 years, pays 1.5% - coupon semiannually BUT it will start paying coupons on 1/1/2021. If the zero-rate curve (continuously compounded) is given by:

Maturity (Years)	Rate (annualized)
.5	.25 %
1	.75 %
1.5	1.0 %
2	1.1 %
2.5	1.3 %
3	1.5 %
3.5	1.75 %
4	2.0 %

a) What should the price of the bond be?

b) How would you compute the yield-to-maturity of the bond? (don't do it, just tell me what equation you would have to solve)

c) Assuming that the yield-to-maturity is 1.9888%, compute the duration of the bond.

d) Use the duration to approximate the value of the bond when its ytm moves up by 10 basis points.

2) Using the yield curve from the previous problem compute the price of a 2-year bond that pays semiannual coupons that float according to $6-$month Libor $-.5\%$ (six month Libor minus half a percent).

3) Also using the curve from problem (1)

a) Compute the swap rate for a swap that exchanges fixed for floating, starts in 1 year and ends in 2 years. Two periods, six months each and the first payment is in 18 months.

b) What is the value of the swap if it pays 1.25% fixed and receives floating on a notional of $\$10,000,000$ (same swap as in (a)).

c) What is the value of an FRA that pays 1% (semiannual compounding) for the $6-$month period that starts in 6 months? (so, between 6 months and 1 year).

4) Suppose that a certain stock S is trading at \$100. A $1-$year call with strike $K = 100$ is trading at \$.75. If the $1-$ year risk-free rate is 1% and S does not pay dividends, prove that there is an arbitrage opportunity.

5) A certain non-dividend paying stock is trading at \$50 and its volatility is $\sigma = 25\%$. The risk-free interest rate is 1.25% per anuum with continuous compounding.

a) Use a two-step tree ($\Delta t = .5$) to compute the value of $1-$year European put option with strike price of \$50?

b) What would it be the price if the put were to be American?