HOMEWORK 4

These questions refer to the attached sheet which shows five paths of the short-term interest rate over a five year horizon. Ignore issues of compounding at this point and assume that the average interest rate over some horizon is just the simple average of the short-term rates over the horizon (including the time zero short-term rate); this is the same way we did things in the class lecture.

1. Solve for the prices of zero-coupon bonds with maturities ranging from one to five years.

2. Solve for the price of a five year interest rate cap on the short-term rate with a strike rate of .045. An interest rate cap consists of a series of five individual caplets, one for each of the five annual dates. The cash flow for a caplet with maturity T is $\max(0, r_T - K)$, where r_T is the short-term rate at time T and K is the strike rate.

3. Solve for the price of a five year interest rate floor on the short-term rate with a strike rate of .067. A floor consists of a series of five individual floorlets, one for each of the five annual dates. The cash flow for a floorlet with maturity T is $\max(0, K - r_T)$ using the same notation as in problem 2.

4. Which is more valuable? A five year call option (caplet) on the short interest rate or a five year put option (floorlet) on the short term interest rate? Assume that the strike rate is .067.

5. Which is more valuable? A five year call option (caplet) on the short interest rate or a five year call option on the average short term interest rate during the five years? Assume that the strike rate is .063.

6. Continuing with problem 5, compute the standard deviation of the short-term rate in year 5. Similarly compute the standard deviation of the average short-term interest rate during the five year horizon. What insights does this give you about problem 5.

Path	t=0	t=1	t=2	t=3	t=4	t=5
1	.049	.058	.071	.068	.075	.092
2	.049	.044	.037	.056	.062	.069
3	.049	.031	.026	.051	.067	.048
4	.049	.050	.061	.069	.069	.060
5	.049	.044	.055	.061	.058	.065