471/571 - HW5

due Wed, Nov 16th

Name: ______________________________

1. Project P requires an investment of 4000 at time 0. The investment pays 2000 at time 1 and 4000 at time 2. Project Q requires an investment of X at time 2. The investment pays 2000 at time 0 and 4000 at time 1. The net present values of the two projects are equal at an interest rate of 10%. Calculate X.

2. An investor pays \$100,000 today for a 4-year investment that returns cash flows of \$60,000 at the end of each of years 3 and 4. The cash flows can be reinvested at 4.0% per annum effective. If the rate of interest at which the investment is to be valued is 5.0%, what is the net present value of this investment today?

3. At the beginning of the year, an investment fund was established with an initial deposit of 1000. A new deposit of 1000 was made at the end of 4 months. Withdrawals of 200 and 500 were made at the end of 6 months and 8 months, respectively. The amount in the fund at the end of the year is 1560. Calculate the dollar-weighted yield rate earned by the fund during the year.

4. Yield rates to maturity for zero coupon bonds are currently quoted at 8.5% for one-year maturity, 9.5% for two-year maturity, and 10.5% for three-year maturity. Let i be the one-year forward rate for year two implied by current yields of these bonds. Calculate i.

5. You are given the following term structure of spot interest rates:

Term (in years)	Spot interest rate
1	5.00%
2	5.75%
3	6.25%
4	6.50%

A three-year annuity-immediate will be issued a year from now with annual payments of 5000. (so 5000 is coming at t=2,3,and 4). Using the forward rates, calculate the present value of this annuity a year from now.

6. The current price of an annual coupon bond is 100. The derivative of the price of the bond with respect to the yield to maturity is -700. The yield to maturity is an annual effective rate of 8%. Calculate the duration of the bond.

7. Calculate the duration of a common stock that pays dividends at the end of each year as perpetuity. Assume that the dividend is constant, and that the effective rate of interest is 10%.