Problem Set 1

Question 1.

You win a lottery with a prize of $1.5 million. Unfortunately the prize is paid in 10 equal annual installments. The first payment is next year. How much is the prize really worth? The discount rate is 8 %.

Question 2.

(a) The cost of a new automobile is $10,000, and this price will remain the same over the next 10 years. If the interest rate is 5%, how much would you have to set aside now to be able to buy the car in five years?

(b) You have to pay $12,000 a year in school fees at the end of each of the next six years. If the interest rate is 8%, how much do you need to set aside today to cover these bills?

Question 3.

Seahawk Lines is considering the purchase of a new bulk carrier for $8 million. The forecasted revenues are $5 million a year and operating costs are $4 million starting one year after the purchase. A major refit costing $2 million will be required at the end of both the fifth and tenth years. After 15 years the ship is expected to be sold for scrap at $1.5 million. If the discount rate is 8%, what is the ship's NPV?

Question 4.

You own an oil pipeline which will generate $2 million cash return over the coming year, paid at the end of the year. The pipeline's operating costs are negligible, and it is expected to last for a very long time. Unfortunately, the volume of oil shipped is declining, and cash flows are expected to decline by 4 % per year. The discount rate is 10%. What is the PV of the pipeline's cash flows if its cash flows are assumed to last forever?

Question 5.

The interest rate is 10% but the government offers you a subsidized perpetual loan for $1M at 5%. In other words, you get the $1M today and, in return, you pay the government $50,000 a year forever (you are immortal). How much is this subsidy worth?

Question 6.

Your graduating class has decided to endow a chair at Stern for a worthy young assistant professor of finance. The University suggests an endowment that generates $100,000 a year forever. The discount rate is 10%. If your class pledges $150,000 a year (starting next year), how long will it take to have enough to endow the chair (HINT: You only start paying the salary after you have enough resources to endow the chair)?

Question 7.

Consider the following three stocks.
(a) Stock A is expected to provide a dividend of $10 a share forever (starting next year).
(b) Stock B is expected to pay a dividend of $5 next year. Thereafter, dividend growth is expected to be 4% a year forever.
(c) Stock C is expected to pay a dividend of $5 next year. Thereafter, dividend growth is expected to be 20% a year for 5 years (i.e., until year 6) and zero dividend growth thereafter.
If the discount rate for each stock is 10%, which stock is the most valuable? What if the discount rate is7% (HINT: Recall from your Foundations of Finance class that the price of a stock is the PV of the dividends)?