FIN 438 Practice Problems

FV , PV & RETURNS

1 a.   At the end of 10 years, how much is an initial deposit of $100 worth, assuming an interest rate of 10 percent compounded (1) annually? (2) semi-annually? (3) quarterly? (4) continuously?

  b. $100 at the end of 3 years is worth how much today, assuming a discount rate of (1) 10 percent (2) 100 percent? (3) 0 percent?

  c.   Suppose you can buy a security at a price of $78.35 which will pay you $100 after 5 yrs. What is the annual rate of return that you are earning? (5%)

  d.   You have been saving up to buy the Panther Co. The total cost will be $10m. You currently have about $2.3m. How long will you have to wait if you can earn 5% on your money? (30 yrs)

  e.   You have been offered an investment that promises to double your money every 10 yrs. What is the rate of return on investment? (7.177%)

ANNUITIES

2 a.   What is the present value of a 3-year annuity of $100 if the discount rate is 10 percent? ($248.69). If this was annuity due, what would be the PV ?

  b.   What is the present value of the regular annuity in (a) if you have to wait 2 years for the payment stream to start instead of 1 year? ($ 226.08)

  c.   If you invest $750 every six months at 12% annual rate compounded semi-annually, how much would you accumulate at the end of 10 years? ($27,588.75)

PERPETUITY

3.   a. What is the PV of a perpetuity with payment of $100 per yr if the discount rate is 8%?
      b. What is the PV of perpetuity in a) if you have to wait 5yrs to receive the first payment?

EAR

4.   Suppose you can borrow money at 8.6 percent per year (APR) compounded semiannually or 8.4 percent per year (APR) compounded monthly. Which is the better deal?

5.   If you take out an $8000 car loan that calls for 48 monthly payments at an APR of 10 percent, what is your monthly payment? What is the effective annual interest rate on the loan? ($202.90, 10.47%)

PV(uneven stream of cash flows)

6.   The following uneven stream of cash flows is given to you:

Years	CF
1	$100
2-5	$200/yr
6	$0
7	$1,000

a) Find the PV of the CF stream if the discount rate is 6% ($1413.24)
b.) Find the FV (or terminal value) of the above CF stream at 6% discount rate. ($2,124.92)

LOAN AMORTIZATION

7.   You take out a 30-year $100,000 mortgage loan with an APR of 8 percent and monthly payments.
a.   What is your monthly payment?
b.   In 10 years you decide to sell your house and pay off the mortgage. How much do you have to pay? (you pay the remaining principal balance) ($87,724)
c.   You just made the 120th pmt. How much of this pmt goes towards principal? And towards interest?
d.   How much interest would you have paid over the life of the loan?
e.   Instead of 30 yrs, if you had taken out 15-yr loan, what is the increase in your monthly pmt ? Over the life of the loan, how much interest would you have paid? Compare this with the 30yr loan.

MISC.

8.   Selyn Cohen is 65 years old and recently retired. He wishes to provide retirement income for himself and is considering an annuity contract with Monument Life Insurance Company. Such a contract pays him an equal amount each year he lives. For this cash-flow stream, he must put up so much money at the beginning. According to actuarial tables, his life expectancy is 15 years, and that is the duration on which the insurance company bases its calculations regardless of how long Cohen actually lives.
a.   If Monument Life uses an interest rate of 5 percent in its calculations, what must Cohen pay at the outset for an annuity providing him $10,000 per year? (Assume annual payments are at the end of each of the 15 years.)($103,796)
b.   If Cohen had $30,000 to put into an annuity, how much would he receive each year if the insurance company used a 5 percent interest rate in its calculations? ($3,944.20)

9.   a. You believe you will spend $40,000 a year for 20 years once you retire in 40 years. If the interest rate is 4 percent per year, how much must you save each year until retirement to meet your retirement goal? ($5,720.71)

      b. Same problem. Instead of saving each year, you decide to invest a lump sum today. How much you have to invest to meet your retirement goal?

10.   You just graduated from college and have started working. You are 25 yrs old and you think you will work for 30 yrs and retire when you are 55. You wish to save money to provide for your retirement. After you retire you think you will need $10,000 per month to live comfortably for another 25 yrs. You open a retirement savings account and beginning one month from now you will begin depositing a fixed amount into a stock index fund every month for 30 yrs. You can expect to earn 12% annual rate of return compounded monthly on an index fund. How much should your monthly deposits be? [Assume that the fund will continue to earn 12% annual return compounded monthly]

11.   A famous quarterback just signed a $15 million contract providing $3 million a year for 5 years. A less famous receiver signed a $14 million 5-year contract providing $4 million now and $2 million a year for 5 years. Who is better paid? The interest rate is 10 percent. ($11.37m, $11.58m)

12.   A local bank advertises the following deal: "Pay us $100 a year for 10 years and we will pay you (or your beneficiaries) $100 a year *forever*." Is this a good deal if the interest rate available on other deposits is 8 percent?

13.   You have $10,000 to invest. The First National Bank offers one-year certificates of deposit with a stated rate of 5.50% compounded quarterly. What rate compounded semiannually would provide you with the same amount of money at the end of one year?

14.   You have just won a lottery prize. You can choose to receive $750,000 today or an annual payment of $50,000 at the end of each of the next twenty years. What is the interest rate that makes you indifferent between the two?

15.   You are going to withdraw $1,000 at the end of each year for the next three years from an account that pays interest at a rate of 8% compounded annually. The account balance will reduce to zero when the last withdrawal is made.

      a. How much interest will you earn on the account over the three year life?

      b. How much will be left in the account after the first withdrawal?

16.   You are willing to pay $15,625 to purchase a perpetuity which will pay you and your heirs $1250 each yr., forever. If your required rate of return does not change, how much would you be willing to pay if this were a 20yr., annual payment, ordinary annuity instead of a perpetuity? ($12, 273)

17.   Four years from now you will receive the first of seven annual $10,000 payments. The current interest rate is 6%, but by the beginning of year 4, the rate will have risen to 8%. What is the present value of this cash flow stream?

18.   You work for a furniture store. You normally sell a living room set for $2,500 and finance the full purchase price for 30 monthly payments at 24% APR. You are planning to run a zero-interest financing sale during which you will finance the set over 30 months at 0% interest. How much do you need to raise the price of the bedroom set during the sale in order to earn your usual combined return on the sale and the financing?

19.   Your brother-in-law borrowed $2,000 from you 4 years ago and then disappeared. Yesterday he returned and expressed a desire to pay back the loan, including the interest accrued. Assuming that you had agreed to charge him 10% compounded annually, and assuming that he wishes to make five equal annual payments beginning in one year, how much would your brother-in-law have to pay you annually in order to extinguish the debt? (Assume that the loan continues to accrue interest at 10% per year.)