Solution for Assignment 3

1. 5 years from now, a future receipt of Rs 20,000 at 14% compounded semiannually will be equivalent to present value of Rupees
   a. <mark>10,167</mark>
   b. 9,501
   c. 13,223
   d. 14,000

   Solution: Given, n = 5 year, F = 20000
   1st method to solve: Nominal interest rate = 14% compounded semiannually, n = 5
   Effective annual interest rate = $i_a = (1 + 0.14/2)^2 - 1$ = 14.49% per annum
   P = 20000 x $(1 + 0.1449)^{-5}$ = 10167 (Ans)
   2nd method to solve: Effective Interest rate = 7% per six month, n = 10
   P = 20000 (P/F,7,10) = 20000 x 0.5083 = 10166 (Ans)

2. What value of equal payment series is equivalent to present amount of Rs 65,000 in six years at 8% interest rate compounded quarterly with quarterly payments?
   a. 2,940
   b. 3,067
   c. <mark>3,439</mark>
   d. 4,480

   Solution: Given, P = 65000, n = 6x4 = 24, effective interest rate = 8/4 = 2%
   A = 65000 (A/P,2,24) = 65000 x 0.0529 = 3438.5 ≈ 3439 (Ans)

3. For present amount, P = Rs 10,000 and future amount, F = Rs 30,000, if compounding is quarterly, what effective annual interest rate and nominal interest rate will make P and F equivalent for n = 6 years.
   a. <mark>20.1% per year and 18.7% compounded quarterly</mark>
   b. 18.1% per year and 16.2% compounded quarterly
   c. 22.7% per year and 20.9% compounded quarterly
   d. 15.2% per year and 14.8% compounded quarterly

   Solution: Given, P = 10000, F = 30000, n = 6 years, i = effective annual interest rate,
   r = nominal interest rate compounded quarterly
   $(1+i)^n$ = F/P => $(1+i)^6$ = 3 => ln (1+6) = (ln 3)/6 => i = 0.201 = 20.1 % (Ans)
   Now, 0.201 = $(1 + r/4)^4 - 1$ => r = 0.1874 = 18.7 % (Ans)

4. Single amount at the end of fifth year, which will be equivalent to uniform annual series of Rs 20,000 per year for 12 years at 7% interest rate compounded annually will be Rupees
   a. 1,87,867
   b. 2,00,879
   c. <mark>2,22,796</mark>
   d. 2,45,480

   Solution: Given, A = 20000, I = 7%, F_5 (equivalent future value at n = 5) =?
   Equivalent value of F5 at present time = Equivalent value of annual payment series at present time
   F_5 (P/F,7,5) = 20000 (P/A,7,12) => F_5 (0.7130) = 20000 (7.9427) => F_5 = 222796 (Ans)

5. The annual equivalent of series of payment of Rs 20,000 per year, received at the end of each of the next 3 year, at an interest rate of 10% is
   a. <mark>Rs 20,000/year</mark>
   b. Less than Rs 20,000/year
   c. More than Rs 20,000/year
   d. 20,000 (A/P, 10,3)

   Solution: Annual equivalent is nothing but annual payment of the series, which is given already in the question as 2000 per year.

6. A machine is purchased for Rs 9,00,000 with useful life of 10 years and a salvage value at the end of its life Rs 1,50,000. At 15% interest rate compounded annually, the capital cost of machine will be
    a. Rs 1,95,587
    b. Rs 1,49,501
    c. Rs 1,87,722
    d. Rs 1,71,974
    Solution: Given, P (First cost of machine) = 900000, F (Salvage value) = 150000, i = 15%, n = 10
    CR(i) = (P-F) (A/P,i,n) + Fi = (900000 - 150000) (A/P,15,10) + 150000 (0.15)
        = 750000 (0.1993) + 150000 (0.15)
        = 171974 (Ans)
7. The element which is not involved while calculating equivalence of sums of money is
    a. Amount of sums
    b. Times of occurrence of sum
    c. Interest rate
    d. Type of investment
    Solution: Type of investment does not affect the equivalent value of sum of money.
8. Principle of equivalence states that actual interest rate earned is the one which sets
    a. Equivalent receipts equal to equivalent disbursements
    b. Equivalent receipts more than equivalent disbursements
    c. Equivalent receipts less than equivalent disbursements
    d. None of these
9. Future worth of payment series of Rs 10,000 at the end of each year for 5 years at 10% interest rate compounded annually will be
    a. 10000 (F/A, 10, 5)
    b. 10000 (F/A, 5, 10)
    c. 10000 (A/F, 10, 5)
    d. 10000 (A/F, 5, 10)
10. If you wish to withdraw Rs 50,000, Rs 80,000, Rs 1,10,000 and Rs 1,40,000 at the end of 2nd, 3rd, 4th and 5th year from now from a savings accounts which earns 8% interest rate compounded annually, the amount you should deposit now is
    a. [50000 + 30000 (A/G, 8, 4)](P/A, 8, 5)(P/F, 8, 1)
    b. [50000 + 30000 (A/G, 8, 4)](P/A, 8, 4)(P/F, 8, 1)
    c. [50000 + 30000 (A/G, 8, 4)](A/P, 8, 5)(P/F, 8, 1)
    d. [50000 + 30000 (A/G, 8, 4)](A/P, 8, 4)(P/F, 8, 1)