1 – (5 points) For a 3-year loan, a borrower has a choice between an annual simple interest rate of 14% and an annual simple discount rate of 12%. Which is preferable for the borrower?

2 – (7 points) Jane deposits $100 for 10 years. Simple interest is at 8% for the first three years, at 7% for the next five years, and at 9% for the last two years. Find the equivalent annual effective rate of interest over the 10 year period.

3 – (5 points) John has been making deposits of $200 at the end of every quarter for the past five years. Now, he decides to increase the amount of each payment so as to accumulate $30,000 at the end of 10 years from now. If interest is at the nominal rate of 8% convertible quarterly, what is the amount he must pay at the end of every quarter?

4 – (8 points) At what nominal rate of interest rate compounded monthly would an investment of $2,000 immediately accumulate to $2,200 in 9 months time?

 a) Using a calculator

 b) Using linear interpolation

5 – (6 points) An annuity consists of payments of $1,000 that are to be made every six months with the first occurring on February 15, 1986 and the last on August 15, 1996. If interest is at the nominal rate of 4% convertible semi-annually, find the value of this annuity on:

 a) (4points) February 15, 1990

 b) (2 points) August 15, 1998

6 – (6 points) An alumnus wants to provide an annual scholarship of $10,000 for an indefinitely long period. If the endowment is to be invested at an annual effective rate of 8% and if the first scholarship will be provided 5 years from now how much must he donate to the college now?

7 – (8 points) Claudia deposits $5,000 in a pension fund at the beginning of every year for 20 years. Interest is at annual effective rate of 8% for the first 12 years and at 4% effective thereafter. If the nominal interest rate is 12% compounded monthly after the 20th year, what is the monthly amount she can then withdrawn at the beginning of each month for a period of 15 years?

8 – (6 points) A loan of $10,000 is to be repaid with annual payments at the end of each year for the next 40 years. For the first ten years, the payments are k per year, the second ten years, 2k per year; the third ten years, 3k per year; and the fourth ten years, 4k per year. If interest is at the annual effective rate of 8%, find k

9 – (8 points) Annuity A pays x at the end of every quarter for 5 years and annuity B pays $100 at the end of every year for 10 years. The nominal rate of interest is 8% convertible semi-annually. Find x knowing that A is equal to B.

10 – (6 points) For the same amount of money, Tony can either buy a 20-year annuity-immediate with annual payments of $1,500, or a 40-year annuity-immediate with annual payments of $1,000. Both annuities earn the same annual effective interest rate of i. Find i

11 – (8 points) A $20,000 loan is being repaid by payments of $1,000 at the end of every month for as long as necessary, plus one smaller final payment. If the nominal interest rate is 12% convertible monthly, find:

 a) The amount of interest and principal in the fifth payment

 b) How long it takes to repay the loan, and the amount of the final smaller payment.

12 – (13 points) A loan of $1,000 is to repaid over three years. Interest is charged at the annual effective rate of 4%

 a) (6 points) Complete the amortization schedule for the above loan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Payment Amount | Interest Paid | Principal repaid | Outstanding loan Balance |
| 0 |  |  |  | 1000.00 |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  | 0 |

 b) (7 points) Complete the sinking fund schedule for the above loan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Interest Paid | Sinking Fund Deposit | Interest earned on sinking fund | Amount in sinking fund | Net amount of loan |
| 0 |  |  |  |  | 1000.00 |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  | 0 |

13 – (6 points) A firm borrows $10,000 for 6 years at an annual effective interest rate of 6.555%. A sinking fund is set up at 4% convertible annually to repay the debt. At what annual effective interest rate would an amortization plan have the same annual payments? (Hint: After solving, find the final answer from the tables).

14 – (8 points) A $1,000 par value 10-year bond has coupons at 8% convertible semi-annually. The bond, which will be redeemed at $1,100 is bought to yield 12% convertible semi-annually. Complete the information below, then calculate the price of this bond in two different ways.

F =

C =

R =

G =

I =

N =

K =

G = Fr/i =

Price =

Price =