

PSTAT 171 Week 3 Section 1

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Problem 1

Sylvia is repaying a loan of X by making 17 annual payments of 100. Each payment consists of interest on the loan at 5% effective and an amount that is deposit in a sinking fund earning 4% effective. At the end of 17 years, the amount in the sinking fund is equal to the original loan amount accumulated with interest at the sinking fund rate. Determine X .

Notes (Continued)

Problem 2

Henry is repaying a loan at an effective rate of 5% a year. The payments at the end of each year for 10 years are 1000 each. In addition to the loan payments, Henry pays premiums for loan insurance at the beginning of each year. The first premium is 0.5% of the original balance, the second premium is 0.5% of the loan premium immediately after the first loan payment, etc., and the tenth premium is 0.5% of the loan balance after the ninth payment. The present value of the premiums at 5% is X . Determine X .

Notes (Continued)

Problem 3

A house purchase for \$200,000 and a 20% down payment is made. The balance is financed by a 30-year adjustable rate mortgage with monthly payments. The initial interest rate is 12% per annum, compounded monthly. Just after the 240th payment, the interest rate is increased to 14% compounded monthly. The payments remain at the original amount until a final smaller payment fully repays the loan. What is the total number of monthly mortgage payments made over the life of the loan, including the final smaller payment?

Notes (Continued)

Multiple Choice

Problem 2

A ten year loan of 10,000 at 8% annual effective can be repaid using any of the four following methods:

- (i) Amortization Method, with annual payments at the end of each year.
- (ii) Repay the principal at the end of ten years which paying 8% annual effective interest on the loan at the end of each year. In addition, make equal annual deposits at the end of each year into a sinking fund earning 6% annual effective so that the sinking fund accumulates to 10,000 at the end of 10th year.
- (iii) Same as (ii), except the sinking fund earns 8% annual effective.
- (iv) Same as (ii), except the sinking funds earns 12% effective.

Rank the annual payment amounts of each method.

Notes (Continued)

Problem 1

Smith can repay a loan of 250,000 in one of the two ways:

- i. 30 annual payments based on amortization at $i = .12$;
- ii. 30 annual interest payments to the lender at rate $i = .1$, along with 30 level annual deposit to a sinking fund earning rate j .

Find the level of j to make the scheme equivalent.

Problem 2

A homebuyer borrows \$250,000 to be repaid over a 30-year period with level monthly payments beginning one month after the loan is made. The interest rate on the loan is a nominal annual rate of 9% compounded monthly. Find each of the following:

- (a) the amount of interest and the amount of principal paid in the first year.
- (b) the amount of interest and the amount of principal paid in the 30th year.

Problem 3

A 20-year loan of 1000 is repaid with payments at the end of each year. Each of the first ten payments equals 150% of the amount of interest due. Each of the last ten payments is X . The lender charges interest at an annual effective rate of 10%. Calculate X .