Finite Math - J-term 2019

Lecture Notes - 1/14/2019

Homework

- Section 3.4 - 33, 46, 47, 49, 50

Section 3.4 - Present Value of an Annuity; Amortization

Amortization. *Amortization* is the process of paying off a debt. The formula for present value of an annuity will allow us to model the process of paying off a loan or other debt. The reason the formula is the same is because receiving payments from your savings account is essentially the bank repaying you the money you loaned them by depositing it into a savings account.

Example 1. *Suppose you take out a* 5*-year,* $25,000 *loan from your bank to purchase a new car. If your bank gives you* 1.9% *interest compounded monthly on the loan and you make equal monthly payments, how much will your monthly payment be?*

Solution.

We get the following formula

Definition 1 (Amortization)**.**

where all the variables have the same meaning as for annuities.

Example 2. *If you sell your car to someone for* $\$2,400$ *and agree to finance it at* 1% *per month (*12% *annual rate) on the unpaid balance, how much should you receive each month to amortize the loan in* 24 *months? How much interest will you receive?*

Solution.

Application. An interesting application of annuities uses a combination of present value and future value.

Example 3. *The full retirement age in the US is* 67 *for people born in* 1960 *or later. Suppose you start saving for retirement at* 27 *years old and you would like to save enough to withdraw* $\$40,000$ *per year for the next* 20 *years. If you find a retirement savings account (for example, a Roth IRA) which pays* 4% *interest compounded annually, how much will you have to deposit per year from age* 27 *until you retire in order to be able to make your desired withdraws?*

Solution.

Example 4. *Lincoln Benefit Life offered an ordinary annuity earning* 6.5% *compounded annually. If* $\$2,000$ *is deposited annually for the first* 25 *years, how much can be withdrawn annually for the next* 20 *years?*

Solution.