

3.4: Present Value of an Annuity; Amortization

Present Value of an Ordinary Annuity

$$PV = PMT \left[\frac{1 - (1 + i)^{-n}}{i} \right]$$

where

PMT = periodic payment (made at end of period)

$i = \frac{r}{m}$ = rate per period

n = number of payments (periods)

PV = present value of all payments

Example 1: How much should you deposit into an account that pays 6% compounded semiannually so that \$1,000 may be withdrawn every 6 months for three years?

The *amortization* of a debt is the process of paying it off in equal installments. For example, if I buy a new car and don't have the cash for it, I *amortize* the debt by making equal monthly payments.

Example 2: Scott buys a fancy television for \$800. He plans to make equal monthly payments for 18 months at 18% compounded monthly.

- a. What are his monthly payments?
- b. How much total interest will he pay?

Example 3: I buy a car for \$15,000. I put \$700 down and the dealer gives me \$800 for my trade-in. I finance the rest at 5.5% for five years (compounded monthly). How large are my monthly payments? How much total money do I pay for the car? How much interest?

Example 4: Scott and Jennifer are considering buying a house. The house they like costs \$110,000, and they have saved \$10,000 for a down payment.

- a. What will be their monthly payment for a 30-year loan at 5% (compounded monthly)? How much interest will they pay?
- b. What will be their monthly payment for a 15-year loan at 5% (compounded monthly)? How much interest will they pay?
- c. What will be their monthly payment for a 15-year loan at 4.6% (compounded monthly)? How much interest will they pay?

Summary of formulas: