5.2: Annuities

An annuity is an account with payments made to it at regular time intervals.

Examples of annuity: regular deposits into a saving account, monthly home mortgage payments, monthly insurance payments.

We use TVM Solver to study annuities that are

- certain (terms are given by fixed time periods)
- ordinary (payments made at the END of the payment periods)
- simple (the payment periods coincide with the interest conversion periods: P/Y=C/Y)
- equal payments

The Future Value of an Annuity is where you are trying to find how much money will be in the account after depositing equal amounts over a fixed time period.

EXAMPLE 1. *Paul makes a quarterly deposit of* \$250 *in his saving account earning interest at the rate of 3.8% per year compounded quarterly.*

(a) *How much will he have in the account after 7 years?*

$$\begin{aligned} N &= & & \\ I\% &= & FV &= \\ PV &= & P/Y &= \\ PMT &= & C/Y &= \end{aligned}$$

(b) *How much interest will he earn over the 7 years?*

EXAMPLE 2. *A young man puts* \$100 *every month into an account for* 3 *years. If the interest is compounded monthly, what is the effective rate of interest if he has* \$4084.27 *in the account at the end of 3 years?*

EXAMPLE 3. *Lauren's parents have decided to set up a college fund for her. They decided that* $\$75,000$ *should be enough for this goal. They also decided to open the account when Lauren was 6 years old and make monthly deposits every month until Lauren turns 18. If the account pays interest at a rate of* 4.75% *compounded monthly*

(a) *what is the monthly deposit that would reach the Lauren's parents goal?*

$$\begin{aligned} N &= & FV &= \\ I\% &= & P/Y &= \\ PV &= & C/Y &= \\ PMT &= & & \end{aligned}$$

(b) *How much interest did the account earn?*

The Present Value of an Annuity is where you are making payments to zero out a loan (or reduce the amount) and are looking to find how much the loan was worth in the beginning.

EXAMPLE 4. *Laura made a down payment of* $\$3500$ *toward the purchase of a new car. To pay the balance of the purchase price, she has secured a loan from her bank at the rate of* $10\%/year$ *compounded monthly. Under the terms of her finance agreement she is required to make payments of* $\$200/month$ *for 40 months. What is the original price (cash price) of the car?*

$$\begin{aligned} \text{N} &= \\ \text{I\%} &= \\ \text{PV} &= \\ \text{PMT} &= \\ \text{FV} &= \\ \text{P/Y} &= \\ \text{C/Y} &= \end{aligned}$$