Math 141 Key Topics: 5.1-5.3

Section 5.1

- **Simple interest** is interest that is computed on the original principal only. If I have a principal of $P$ dollars invested at an interest rate of $r$ per year for $t$ years, then:

  \[ I = Prt \]

  Accumulated Amount: \[ A = P + Prt = P(1 + rt) \]

  Note: For simple interest formulas, $r$ must be written as a decimal. Also, make sure $t$ is in years.

- **Compound interest** is interest that is computed on the new accumulated amount, not just the original principal, after each compounding period.

- We can solve problems that involve compound interest by using TVM Solver on the calculator.

  \[ N = \text{the total number of compounding periods.} \]
  \[ I\% = \text{the interest rate as a percent.} \]
  \[ PV = \text{present value (original principal).} \]
  \[ PMT = \text{payment amount per period. (0 if there are no payments.)} \]
  \[ FV = \text{future value (accumulated amount).} \]
  \[ P/Y = C/Y = \text{number of compounding periods per year.} \]
  \[ PMT: \text{END BEGIN (For this class, always have END selected.)} \]

  To solve for a value, move the cursor to that positions and press `ALPHA, ENTER`.
  
  Note: Make a value negative in TVM Solver if money is begin invested or paid. Make a value positive if money is being borrowed or received. This is done to represent the flow of money from the perspective of the investor/borrower. If money is being taken out of your pocket, this is negative flow. If money is being put into your pocket, this is positive flow.

- When interest is **compounded continuously**, we use the following formula to find the accumulated amount:

  \[ A = Pe^{rt} \]

  Note: Again, make sure that $r$ is written as a decimal in this formula and that $t$ is in years.

- The **effective interest rate** is the simple interest rate that would yield the same accumulated amount in one year as the compound interest rate would by compounding $m$ times a year. It is used to compare interest rates. The command `Eff` under the Finance menu computes this for you.

  \[ Eff(I, m) \]

  where $I$ is the interest rate as a percent and $m$ is the number of compounding periods per year.
Sections 5.2 and 5.3

- An **annuity** is a sequence of payments made at regular time intervals. (Ex: Depositing money each month into a savings account.)

- To **amortize** a debt or loan means to pay the debt or loan off with a series of payments. (Ex: Paying off a mortgage or student loans.)

- A **sinking fund** is an account set up for a specific purpose at some future date. (Ex: Retirement account or vacation fund.)

- Some general hints for finance problems:
  1. When taking out a loan, make sure any down payments are subtracted from the original cash price in order to determine the value of the loan.
  2. To find the payment required to pay off a loan, make PV the original value of the loan and set FV equal to 0 (since the loan will be paid off completely.)
  3. To find the outstanding principal (how much you still owe) at a certain point, find the present value (PV) of the remaining payments. (Some instructors teach another method, which is to let \( N \) be the number of payments that have already been made and then to solve for FV.)
  4. Equity is how much of an item you actually own (what belongs to you).
     \[
     \text{Equity} = \text{Value of Item} - \text{Outstanding Principal}
     \]