Section 4.1
Simple Interest, Future Value and Present Value

Interest that is computed on the original principal only is called **simple interest.**

Formula: $I = \text{Pr}t$

where P = principal
   r = rate
   t = time (in years)

The sum of the principal and interest after t years is called the **accumulated amount.**

Formula: $F = P(1 + rt)$

Example 1: Find the simple interest on a $1,000 investment made for 3 years at an interest rate of 5% per year. What is the accumulated amount?

Example 2: Find the simple interest rate at which $1,000 will grow to $1,050 in 9 months.

Earned interest that is periodically added to the principal and thereafter itself earns interest at the same rate is called **compound interest.**

Future Value with compound interest Formula:

$$F = P(1+i)^n \qquad \text{where } i = \frac{r}{m} \text{ and } n = mt.$$

F stands for the **Future Value** or the accumulated amount at the end of n conversion periods. A **conversion period** refers to the interval of time between successive interest calculations.

P stands for the **Present Value** or principal.
r stands for the interest rate per year.
m stands for the number of conversion periods per year.
t stands for time (in years).

Example 3: Find the accumulated amount after 5 years if $1700 is invested at 6.25% per year compounded quarterly.

Recall $F = P(1 + i)^n$ and P = Present Value. Solving the Future Value formula for P we obtain the

Present Value with compound interest formula:

$$P = F(1+i)^{-n}$$

Example 4: A newborn child receives a $5,000 gift towards a college education from her grandparents. How much will the $5,000 be worth in 17 years if it is invested at 9% per year compounded quarterly?

Example 5: In a certain area of a local town, housing costs have been increasing at 6% per year compounded annually for the past 4 years. A house currently worth $200,000 would have had what value 4 years ago?

Example 6: An Individual Retirement Account (IRA) has $20,000 in it and the owner decides not to add any more money to the account other than interest earned at 8% per year compounded monthly. How much will be in the account 35 years from now when the owner reaches retirement age?

Example 7: Kaylin's son will be leaving to an out-of-state private university this year. Twenty years ago she set up an account to help pay for his college tuition. She pays out the total amount earned, which is $25, 678.90. How much did she originally invest in this account at the rate of 7% per year compounded monthly?