Section 4.1
Simple Interest, Future Value, and Present Value

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

**Formula:** \( I = Prt \)

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.

Try this one: Carrie owns a petting zoo and has 20 rabbits. If the population grows at a rate of 10% a year, approximately how many rabbits will she have three years from now?
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:**

\[ F = P(1 + i)^n \]

where \( i = \frac{r}{m} \) 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.

Try this one: You set-up an account for retirement and deposited $25,000 in it. The account will pay 8% per year compounded monthly. How much will you have in the account in 30 years when you retire?