Math 1313
Chapter 5 – Section 5.1
Simple Interest, Future Value, Present Value, and Effective Rate

Simple Interest is interest that is computed on the original principal only.

Formula: $I = Prt$, where P is the principal, r is the interest rate and t is time (in years).

Accumulated Amount is the sum of the principal and interest after t years.

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

***P*, *r* and *t* have the same meaning as above.**

Example 1: Find the simple interest on a $1,350 investment made for 2 years at an interest rate of 4% per year.

Example 2: Find the accumulated amount at the end of 7 months on a $900 bank deposit paying simple interest at a rate of 5% per year.

Compound Interest is earned interest that is periodically added to the principal and thereafter itself earns interest at the same rate.

Future Value with Compound Interest Formula:

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

A 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 future value of $2,900 invested at 6.25% per year compounded monthly for 4 years.

Recall: $A = P(1+i)^n$ and that *P* stands for present value.

Why would we want to find *P*?

Well in certain instances an investor may wish to determine how much money he/she should invest now, at a fixed rate of interest, so that he/she will realize a certain sum of money at some future date.

So, solving the Future Value Formula for *P* we obtain the **Present Value with Compound Interest Formula:** $P = A(1+i)^{-n}$,

where *A*, *i* and *n* have the same meaning as before.

Example 4: Find the present value of $5,500 due in 3 years at an interest rate of 2.5% per year compounded semiannually.

Example 5: Tamara would like to take a vacation to the Caribbean Islands in 2 years. She invests $1,500 in a savings account that pays 5% per year compounded semiannually. How much will she have available for her vacation in 2 years?

Example 6: Charlie recently found out that he is going to be a grandfather. He's decided to plan ahead and invest some money in an account for his new grandchild's college education in 18 years. He's invested $5,000 in an account that pays 6% per year compounded quarterly. He plans to leave this investment in this account for 18 years. How much money will his grandchild have towards his/her college education in 18 years?

Example 7: Tyrone invested a sum of money 5 years ago in an account that paid 4.75% per year compounded quarterly. He recently closed the account and received $11,671.00. How much did he originally invest in this account?

Example 8: Kaylin is planning on buying a home in 6 years. She'd like to have $6,000 for a down payment in 6 years. Her credit union has an account that will pay 3% per year compounded monthly. How much must she invest now in this account to have the desired funds available in 6 years?

Effective Rate

Effective Rate of Interest Formula: $$r_{eff} = \left(1 + \frac{r}{m}\right)^{m} - 1$$

where r_{eff} is the effective rate of interest, r is the nominal interest rate per year, and m is the number of conversion periods per year

Note: The effective rate of interest formula shows that money invested at simple interest earns the same amount of interest in one year as money invested at r% per year compounded m times a year.

Example 9: Find the effective rate corresponding to the nominal rate of 10% per year compounded monthly.