Lesson 9 Financial Application of Logs

Future Value

When a series of equal investments is made at equal time intervals, and the compounding period for the interest is equal to the time interval for the investments, the amount in dollars, or Future value (FV), of these investments can be determined using the formula:

$$FV = \frac{R[(1+i)^n - 1]}{i}$$

R = amount of investment

$$i = \frac{\text{interest rate}}{\text{number of compounding periods}}$$

n = number of investments

Example

Determine how many monthly investments of $200 would have to be made into an account that pays 6% annual interest, compounded monthly, for the future value to be $100 000.

Present Value

Many people borrow money to finance a purchase. A loan is usually repaid by making regular equal payments for a fixed period of time. The amount borrowed is called the Present value (PV), of the loan.

$$PV = \frac{R[1-(1+i)^{-n}]}{i}$$

R is the amount of regular payments

i is the interest rate

n is the number of payments

Example

A person borrows $15 000 to buy a car. The person can afford to pay $300 a month. The loan will be repaid with equal monthly payments at 6% annual interest, compounded monthly. Determine the number of monthly payments required to pay off the loan.

Compound Interest

Compound Interest: earning interest on interest, can be computed annually, semi-annually, quarterly, monthly

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A is the amount accumulated after t years

P is the amount invested (principal)

r is the annual interest rate

t is the time in years

n is the number of compounding periods per year

Examples

1. A $5000 investment earns interest at an annual rate of 8.4% compounded monthly.

   a) Determine how much the investment is worth after 10 years.

   b) Determine the amount of interest that was earned.

2. A principal of \$1 500 is invested at 4% annual interest, compounded quarterly. To the nearest quarter of a year, determine when the amount will be \$2 500.

3. Determine the time required for an investment of \$100 to double at an annual rate of 8% compounded semi-annually.