- INTEREST- a payment made for the use of money over a period of time.
- INTEREST RATE - The ***price*** of using the money over a period of time

COMPOUNDING - calculating the future value

- FUTURE VALUE FACTOR - The value by which a present value must be multiplied to calculate its future value

$$FVF=(1+i)^n$$

- COMPOUNDING - Calculation of the future value of a present sum accounting for the rate of interest

$$FV=PV*(1+i)^n$$

AN EXAMPLE FOR CALCULATING COMPOUNDED VALUE

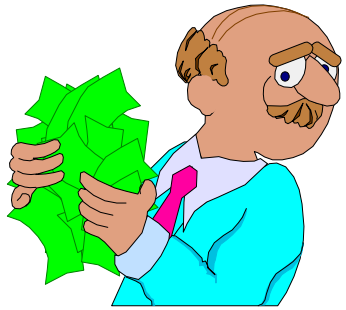
- What is the future value of 4,000$ after 8 months, where the compound interest rate is 2% per month

  pv=4,000

  i=0.02

  n=8

  fv=?



- $F.V.F=(1+0.02)^8=1.1717$

  $FV=4{,}000*1.1717=4{,}686.6$

DISCOUNTING – calculating the present value

- Present Value Factor - The value by which a future value must be multiplied to calculate its present value

$$\mathbf{PVF} = \frac{1}{(1+i)^n}$$

- Discounting - Calculation of the present value of the future sum

$$pv = fv * \frac{1}{(1+i)^n}$$

An Example for Calculating Present Value (Discounting)

What is the present value of $2000 due in 10 years at 5% ?

fv=2000

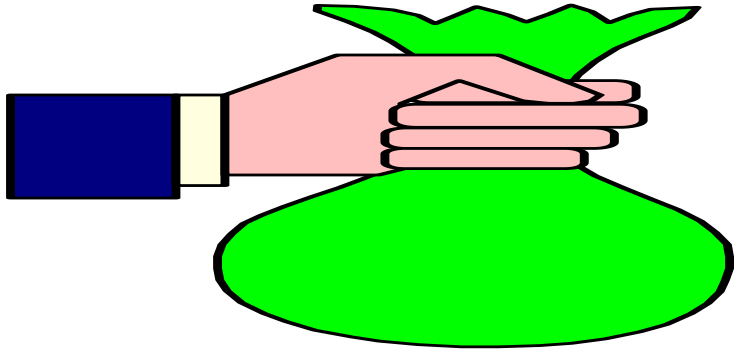
i=0.05

n=10

pv=?

pvf=1/ $(1+0.05)^{10}$ =0.6139

pv=2000*0.6139 =1227.83



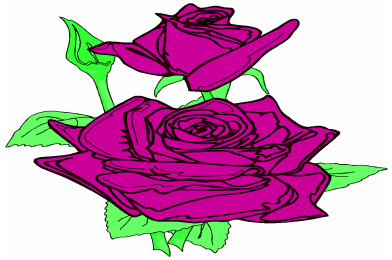
Present Value Annuity Factor

- Denotes the present value of a series of equal sums of $1 each, appearing during n periods of time at i interest rate
- a - the annual sum
- n - number of periods of time the sum appears
- i - interest rate

$$pvaf = \frac{(1+i)^n - 1}{i*(1+i)^n}$$

PVAF - EXAMPLE

- We need to buy a new machine We are offered to pay 3200$ in cash or 500 a year, for 10 years.
- Which way should we prefer , if the interest rate is 8%?



i=8%

n=10

a=500

pv=?

$$pvaf = \frac{(1+0.08)^{10}-1}{0.08*(1+0.08)^{10}} = 6.7101$$

$$pv = 500 * 6.7101 = 3355$$

Future Value Annuity Factor

- **Denotes the future value of a series of sums of $1 each, appearing during n periods of time at i interest rate .**

$$FVAF = \frac{(1+i)^n - 1}{i}$$

FVAF - EXAMPLE

- We want to save money to buy a new asset in 8 years.
  The asset's price is 3,000$ interest rate is 5%.
  Is 300$ a year enough?

FVAF(5%,8)=9.5491

300*9.5491=2864.73

- Conclusion - 300$ a year would not be enough.

CAPITAL RECOVERY FACTOR

- **is used to distribute a single amount invested today over a uniform series of end year payments which have a present value equal to the amount invested today.**

$$CRF = \frac{i*(1+i)^{n}}{(1+i)^{n} - 1}$$

where

a= end year payment

i= interest rate

n= number of years

Capital Recovery Payments - Example

- A loan of 90,000$ was taken for 20 years at an interest rate of 5% a year, what are the annual payment required to recover the loan.
- pv=90,000
  n=20
  i=5%
  a=?
  CRF(5%,20)=0.0802
  90,000*0.0802=7,218