Savings Plans

Future Value (Account Balance in the Future)

One deposit, no withdrawals, compounded interest, unchanging interest rate: balance grows _____ acc. to formula:

$$FV = P \cdot (1 + r/n)^{rt} \quad \text{or} \quad Pe^{rt}$$

↑ interest comp. n times per year

↑ interest comp. continuously

However, usually we set aside money over time.

Ex To save for retirement, set aside $250 a month for 35 years. (MIS 2.3.5 #1)

- Set aside a total of:

  ($250/month) × (_____) × (_____) = $_____

- Invest it (so it can earn interest) instead of putting it in a checking acct. (where it would not earn interest.)
  - Account has avg. of 6.5% APR.
  - Interest compounded monthly.
- See Excel table. Will have _____ in 35 years.
  - At first, monthly interest is _____ $250 monthly deposit.
  - After about ____ years, monthly interest is _____ $250 monthly deposit.
  - By the end, monthly interest is _____ $250 monthly deposit.
  - In all, have deposited $105,000 & earned $_____ interest. The interest is about ____ of the total balance.

Formula for FV in this scenario is more complicated than exponential growth.

$$FV = \frac{(\text{deposit amt.})\left[(1+r/n)^{nt} - 1\right]}{(r/n)}$$

assuming deposits occur regularly, w/ same frequency as interest is compounded

In Excel, enter formula like this:

= FV(rate per period, # periods, paymt. amt, present val)

(deposit amt.) ↓ paymt. amt

rate per period ↑ : APR / (# times comp. per year) = r/n

periods ↑ : (# times comp/yr) · (# years) = n · t

present val ↑ : initial value = P (PV)

Note: Excel will give the answer as a negative number; this is shown by putting the amt in parentheses & coloring it red.

See Excel Spreadsheet, second tab. Try 2.3.5 #2 now.

Determining Payment Amts. to Reach Goal

Have goal for FV of account; how much to deposit into the account each period?

In Excel, enter formula like this:

= PMT(rate per period, # periods, present val., future val.)

rate per period ↑ : $\frac{\text{APR}}{\#\text{times comp. per year}} = r/n$

periods ↑ : $n \cdot t$

present val. ↑ : P or PV (initial amt. deposited)

future val. ↑ : goal amt. for future

Ex: MIS 2.3.5 #7. See Excel Spreadsheet, third tab.