INDE 301 Engineering Economy

Chapter 6 Annual Worth Analysis

- **Introduction**
  - Annual worth (AW) analysis is a variant of the present worth analysis discussed in Chapter 5.
  - However, AW analysis has many advantages that make it a useful technique for comparing alternatives.

- **Advantages of AW analysis**
  - It's a popular analysis technique.
  - It's easy to understand. Results are reported in $/year.
  - It simplifies the process of comparing alternatives
    - No need to compare two alternatives for LCM years
    - Compare for one life cycle of each alternative only

- **How does it work?**
  - For alternative *j*, find the uniform annual series, with value AW_j, which is equivalent to all the cash flows of the alternative at the decision maker's MARR.
  - An alternative *j* with $AW_j \geq 0$ is economically viable.
  - Compare annualized series (the AW_j s) of all alternatives
  - The alternative with largest AW_j is selected.

- **Keep in mind**
  - PW and AW analysis are equivalent
  - An alternative has AW ≥ 0 if and only if PW ≥ 0.
  - An alternative has largest AW among a set of alternatives if and it only if it has the largest PW.

- **AW analysis assumptions**
  - Same as those of PW analysis with the LCM method
    - The service provided by the alternatives will be needed for LCM years or more.
    - An alternative is repeated over each life cycle of the LCM in exactly the same manner.
    - Cash flow estimates are the same in every life cycle.

- **Capital Recovery (CR) calculation**
  - Capital Recovery (CR) is the annualized equivalent of the initial investment P and the future salvage value S of an alternative,

$$CR = -P(A/P, i, n) + S(A/F,i,n) .$$

  - Commonly, CR is added to the annual operating costs AOC to get AW,

$$AW = CR + AOC .$$

- **Annual worth analysis of permanent investments (n = ∞)**
  - This is similar to the capitalized cost analysis in Chapter 5.
  - For a recurrent cash flow *R*,

$$A_R = R\left[\frac{i}{(1+i)^{n_R}-1}\right].$$

  - For a non-recurrent cash flow *C*, occurring at time n_C ,

$$A_c = \frac{PW_c}{i} = \frac{C}{i(1+i)^{nc}}$$