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 comparing alternatives when cash flows repeat. No need to compare the alternatives over the LCM. Compare over life cycle of each alternative.

- **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.
  - When cash flows repeat, AW_j is found over the duration of Alternative *j*. No need to compare over the LCM of lives.
  - If cash flows don't repeat, AW_j is found over a study period.

- **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.

- **Capital Recovery (CR) calculation**
  - Capital Recovery (CR) is the annualized equivalent of the initial investment P and 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 ($n = \infty$)**
  - This is similar to the capitalized cost analysis in Chapter 5.
  - For a cash flow R, recurring every n_R years, starting Year n_R,

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

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

$$A_C = C(P/F,i,n_C)(A/P,i,\infty) = \frac{Ci}{(1+i)^{n_C}} .$$