OBJECTIVES

Chapter 1 - Introduction
Chapter 2 - Basic Concepts
Appendix A - Solving Engineering Problems
Appendix B - Dimensions & Units

1. Define, illustrate, compare and contrast the following terms and concepts:

engineering analysis vs. engineering design
algorithm vs. heuristic
model (as discussed in the notes)
system
- surroundings
- boundary (control surface)
- closed system (control mass) vs. open system (control volume)
- interactions between a system and its surroundings
  - isolated system

property
- extensive vs. intensive
- necessary and sufficient test for a property

state
process
- cycle
- steady-state system

units & dimensions
- primary vs. secondary dimensions
- base units & derived units
- unit conversion factor

weight & mass
- molar mass (molecular weight)
- mole (mol, kmol, lbmol, slugmol, etc.)
- local gravitational field strength
  - standard values : $g = 9.80665$ N/kg $= 1.0000\ lb_f/lb_m = 32.174\ lb_f/slug$
  - relationship to local gravitational acceleration
    - standard values : $g = 9.80665\ m/s^2 = 32.174\ ft/s^2$
- slug vs. pound mass (lb_m or lbm) vs pound force (lb_f or lbf)

continuum hypothesis
- macroscopic vs. microscopic viewpoint

accounting concept
- basic components
  - accumulation within system
  - transport across boundaries
  - generation (production) vs. consumption (destruction) within system
- finite-time vs. rate form
  - rate of accumulation (rate of change)
    - relationship to an ordinary derivative with respect to time
  - transport rate
  - generation (consumption) rate

conserved property vs. non-conserved property

conservation laws vs. accounting statements (balances)

2. Given a sufficient set of conversion factors, convert the numerical value of a physical quantity given in one set of units to another specified set of units.

3. Explain in words the difference between the mass of an object and its weight. Demonstrate this understanding by applying Newton's second law, F = ma, to solve problems involving weight, mass, and acceleration. All answers must be given in standard units.

4. List the seven components of the problem solving format (methodology for engineering problem solving), explain the significance of each part, and use the format correctly in your problem solutions.

5. Given a problem statement like HW Problems 2.1 and 2.1, apply the accounting concept to solve for the desired information. Be sure to clearly indicate the system of interest, the property (or stuff) to be counted, and the time period of interest. Problems should be worked showing sufficient steps so that the method used is clear.

6. Give both a written and a symbolic description of the rate-form of the accounting statement clearly indicating the accumulation, transport, and generation terms.

7. Explain in words the difference between the "rate of accumulation (change)" and the "rate of transport (transport rate)" and "rate of generation/consumption (consumption/generation rate)."