E82 Fall 2002 Final Exam Skills List

1. Given the temperature, pressure, composition and critical properties of a mixture of two real gases, determine the compressibility and the specific volume of the mixture.

2. Given any of the substances in Table B.4 of *Felder & Rousseau*, estimate the latent heat of vaporization from the Antoine B constant.

3. Given the composition of a mixture of two vapors and a gas, where the vapors follow Raoult's law and the gas follows Henry's law, and given the vapor pressures of the vapor and the Henry's law constant for the gas, calculate the dew-point pressure of the mixture and the composition of the dew.

4. Given an adiabatic chemical reactor with a two-reactant, one-product, one-reaction system, all with constant heat capacities, the enthalpy of reaction, the entering molar flow rates, the entering temperature, and the extent of reaction or fractional conversion, find the exiting molar flow rates and the exiting temperature.

5. Given a Carnot engine, and a sufficient set of values from η, W_{net}, Q_{hot}, Q_{cold}, T_{hot}, and T_{cold}, find the values of the remaining variables.

6. Given any of the gas-phase substances in Table B.2 of *Felder & Rousseau*, and assuming ideal-gas behavior, calculate the change in specific entropy going from an initial temperature and volume to a final temperature and volume.

7. Given an isothermal plug-flow reactor with a reaction that exhibits n th-order kinetics, where n is an integer, and a sufficient set of values from V, $\dot{V}$, τ, C_{A_0}, C_A, f_A, k, and n, determine the values of the remaining variables.

8. Given an isothermal well-mixed reactor with either a graphical or analytical relationship between r and C_A, the value of C_A, and a sufficient set of values from V, $\dot{V}$, τ, C_{A_0}, f_A, and the kinetic parameters, determine the values of the remaining variables.