Problem #1
What is the total number of molecules *N* that escape per unit time from a unit area of the surface of a liquid which is at temperature *T*, where its vapor pressure is *P*? Use detailed balance arguments by considering a situation where the liquid is in thermal equilibrium with its vapor at this temperature and pressure (number of molecules striking surface of the liquid is the same as number of molecules leaving the liquid). Treat the vapor as an ideal gas, and assume that molecules striking the surface of the liquid are not appreciably reflected. Estimate the number of molecules *N* escaping per unit time from unit area of the surface of water in a glass at 25 ^{o}C. The vapor pressure of water at this temperature is 23.8 mm Hg. (Hint: use the partition theorem and assume that all molecule in gas phase move with the same average velocity)

In class we considered the solidification of completely miscible mixture. The same reasoning and the same phase diagram can be used when we deal with evaporation (boiling) of two completely miscible liquids. Two following problems deal with the gas-liquid transformation in such a system

Problem #2
#5.59 from the textbook.
Problem#3
5.62 from the textbook.

Extra Credit (5 points)

A professor filled a glass with a mixture of two immiscible liquids - water and CCl_4. At atmospheric pressure water boils at 100 ^{o}C, and CCl_4 boils at 76.7 ^{o}C. The mixture is uniformly heated and at 65.5 ^{o}C, boiling starts at the interface between water and CCl_4 (liquids are immiscible). Determine the ratio of evaporation rates of water and CCl_4 at such “boundary” boiling. The pressure of saturated vapor of water is 25.6 kPa at 65.5 ^{o}C.