Exam 2 Practice Problems (solutions will be posted later)

1. (a) Determine the boiling point of methanol in a rotovap in which the pressure is 0.500 bar. Given: The standard boiling point of methanol (i.e. T_b at p = 1 bar) is 337.2 K, and $\Delta_{vap}H^o$ = 35.27 kJ mol^{-1}. (You may treat $\Delta_{vap}H^o$ = 35.27 as constant.)

(b) What equation did you use to solve (a), and what approximations are inherent in the equation?

2. (a) Consider a rigid container as sketched below. It is divided into two sections of equal volume by a partition. Initially, there is 2 mol O_2 on one side at 2 bar pressure, 2 mol N_2 on the other side also at 2 bar pressure. At a particular time, the partition is removed. Calculate ΔS, the change in entropy after the partition is removed. You may treat the gases as perfect.

2 mol O_2 p = 2 bar	2 mol N_2 p = 2 bar

(b) Consider a rigid container as sketched below. It is divided into two sections of equal volume by a partition. Initially, there is 1 mol O_2 on one side at 1 bar pressure, and a mixture of 1 mol O_2 and 2 mol N_2 on the other side at 3 bar pressure. At a particular time, the partition is removed. Calculate ΔS, the change in entropy after the partition is removed. You may treat the gases as perfect. Hint: construct a cycle, that is, a series of fictitious steps.

1 mol O_2 p = 1 bar	1 mol O_2 + 2 mol N_2 p = 3 bar