Phys 4201: Homework 2

Due **before class** on September 18

1. Two small ($N_1 = N_2 = 3$) initially isolated systems of harmonic oscillators (Einstein solids) are brought into thermal contact. The combined system is isolated. The initial energies are $U(n_1) = 5\hbar\omega$ and $U(n_2) = \hbar\omega$, respectively. Find:

   a). Initial multiplicity of the combined system just before thermal contact.

   b). Total excitation energy of the combined system.

   c). Total number of microstates in the combined system?

   d). All possible combinations of n_1 and n_2 and their multiplicities.

   e). Probability of observing the most probable macrostate?

   f). Probability of observing the initial state, i.e., corresponding to initial states of each system?

2. Kittel and Kroemer, Problem 2.1

3. Kittel and Kroemer, Problem 2.2

4. Kittel and Kroemer, Problem 2.3

5. Kittel and Kroemer, Problem 2.5

   Note that the multiplicity of a combined system in (b) can also be evaluated using equations 1.35, 1.36.