# Worksheet For Class 09/05 (Interacting Einstein Solids)

**1. Binomial Coefficient**

In the following we will use EXCEL (in linux use `libreoffice` ) to determine multiplicities and therefore we will need the EXCEL command for $\begin{pmatrix} a \\ b \end{pmatrix}$, so "$a$ choose $b$", or the binomial coefficient. Use the command `COMBIN(a,b)` in EXCEL for $\Omega(N=3, q=6) = \begin{pmatrix} 8 \\ 6 \end{pmatrix}$ and check if you get the expected result (see solutions to today's homework #6).

**2. Einstein Solids** $N_A = N_B = 3 \quad q_{\rm tot} = q_A + q_B = 6$

(Problem 2.9) Use EXCEL to reproduce Fig. 2.4 (table & graph) on page 57, so for two Einstein solids with $N_A = N_B = 3 \quad q_{\rm tot} = q_A + q_B = 6$. At the beginning of your table set the parameters $N_A$, $N_B$, and $q_{\rm tot}$ and refer to these parameters with absolute references in your table.

**3. Einstein Solids** $N_A = 6 \quad N_B = 4 \quad q_{\rm tot} = q_A + q_B = 6$

(Problem 2.9 continued) Modify your table and graph to show the case $N_A = 6 \quad N_B = 4 \quad q_{\rm tot} = q_A + q_B = 6$. Assuming that all microstates are equally likely, what is the most probable macrostate, and what is its probability? What is the least probable macrostate, and what is its probability?

**4. Einstein Solids** $N_A = 60 \quad N_B = 40 \quad q_{\rm tot} = q_A + q_B = 60$

Now let's just scale up our system size. Modify your table and graph to show the case $N_A = 60 \quad N_B = 40 \quad q_{\rm tot} = q_A + q_B = 60$. Compare the resulting graph with your result in 3.

**5. (if time)**

Try to increase the size even more, so $N_A = 300 \quad N_B = 200 \quad q_{\rm tot} = q_A + q_B = 300$.

**6. (if time)**

What happens if you increase the size to $N_A = 600 \quad N_B = 400 \quad q_{\rm tot} = q_A + q_B = 600$?

**Read:** §2.4

**Homework #7:** 2.10 & 2.11