2.2 Einstein Model of a Solid

(Read)
assume each atom is ~ harmonic oscillator. It can absorb energy in quantized amounts

$$E_n = n\hbar\omega \quad \underbrace{+\tfrac{1}{2}\hbar\omega}_{\text{ignore since it's constant}}$$

N = # of oscillators
q = # of energy units

$$\Omega(N,q) = \binom{q+N-1}{q} = \frac{(q+N-1)!}{q!\,(N-1)!}$$

= multiplicity = # of microstates with N and q.

See Problem 2.5.

(HW is # 2.6)

Not very useful on its own so far....

2.3 Interacting Systems

(HW 2.8)
Examples 2.9 and 2.10)

$\boxed{N_A, q_A}$ $\boxed{N_B, q_B}$

N_A = # of oscillators in solid A
N_B = # " " " " B.

q = total # of energy units $= q_A + q_B$.

Problem 2.9
$N_A = 3$ $N_B = 3$ $q = 6$

List all the macrostates and their multiplicity.

q_A	Ω_A	q_B	Ω_B	$\Omega_A \cdot \Omega_B$

all states have same total q.

Assume: In an isolated system in thermal equilibrium, all accessible microstates are equally probable.