

## 2.2 Einstein Model of a Solid

(Read)

Assume each atom is  $\sim$  harmonic oscillator. It can absorb energy in quantized amounts

$$E_n = n h\omega + \underbrace{\frac{1}{2} h\omega}$$

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.

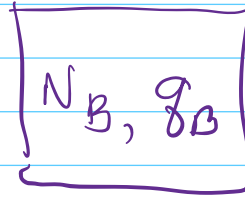
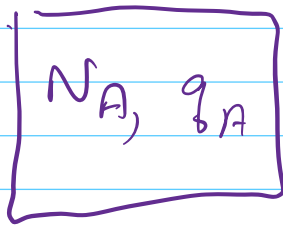
(HW is # 2.6)

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

## 2.3 Interacting System

(HW 2.8)

(Examples 2.9 and 2.10)



$N_A = \#$  of oscillators in solid A

$N_B = \#$  " " " " B.

$g =$  total # of energy units  $= g_A + g_B$ .

Problem 2.9

$$N_A = 3$$

$$N_B = 3 \quad g = 6$$

List all the macrostates and their multiplicity.

$$g_A | \Omega_A | g_B | \Omega_B | \Omega_A \cdot \Omega_B$$

all states have same total  $g$ .

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