PHYS 530: Problem Set 3

Due: 4:30 pm, 7 February 2013

If the answer is shown, all the marks will be given for the derivation not for writing down the answer.

1. [10] Solve problem 2.7 in Pathria's book.
   Derive

   (a) an asymptotic expression for the number of ways in which a given energy E can be distributed among a set of N one-dimensional harmonic oscillators, the energy eigenvalues of the oscillators being $(n + 1/2)\hbar\omega; n = 1, 2, \ldots$, and

   (b) the corresponding expression for the volume of the relevant region of phase space of this system. Establish the correspondence between the two results, showing that the conversion factor ω_0 is precisely h^N.