

Exercises in Statistical Mechanics

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This exercises pool is intended for a graduate course in “statistical mechanics”. Some of the problems are original, while other were assembled from various undocumented sources. In particular some problems originate from exams that were written by B. Horovitz (BGU), S. Fishman (Technion), and D. Cohen (BGU).

===== [Exercise 0122]

Spectral functions for N harmonic oscillators

Consider an ensemble of N harmonic oscillators with an energy spectrum of each oscillator being $(n + \frac{1}{2}) \hbar\omega, n = 0, 1, 2, \dots$

- (a) Evaluate the asymptotic expression for $\Omega(E)$, the number of ways in which a given energy E can be distributed.
- (a) Consider these oscillators as classical and find the volume in phase space for the energy E . Compare the result to (a) and show that the phase space volume corresponding to one state is h^N .