Exercises in Statistical Mechanics

Based on course by Doron Cohen, has to be proofed
Department of Physics, Ben-Gurion University, Beer-Sheva 84105, Israel

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 3210]

Bose gas for general dispersion relation

Consider an ideal Bose gas in d dimensions whose single particle spectrum is given by $\varepsilon = C|p|^s$. Find the condition on s, d for the ence of Bose-Einstein condensation. In particular show that for nonrelativistic particles in two dimensions ($s = d = 2$) the system does not exhibit Bose-Einstein condensation. Show that $P = \left(\frac{s}{d}\right)\left(\frac{E}{V}\right))$ and $CV(T - - > \infty) = \left(\frac{d}{s}\right) N$