Physics 112 - Intro to Statistical and Thermal Physics - Spring 2023
Spoiler Set 09

Problem 9.1 - Permutations

(a) For a spin-1/2 particle, there are two different "ground states" available, $\{|0,\uparrow\rangle, |0,\downarrow\rangle\}$.

(d) Remember that there is one totally symmetric state per permutation class and we only have a totally antisymmetric state in a permutation class if none of the A states contain more than one particle.

(e) You will need to use Stirling's approximation - though you won't need the square root term - and the fact that when $n \gg 1$ we have $(1 + x/n)^n \approx e^x$

Problem 9.2 - A Distribution of Distribution Functions

(e) This is equivalent to showing $\bar{n}_F(\mu + \varepsilon) = 1 - \bar{n}_F(\mu - \varepsilon)$, but please be sure to explain why this is so if you use it.

Problem 9.3 - You Are My Density (of States)

(a) You should find that the answer is independent of energy in this case.

(b) The quantization condition for the momentum remains the same in this case, $\vec{p} = h\vec{n}/2L$.

(c) The quantization condition for the momentum remains the same in this case, $\vec{p} = h\vec{n}/2L$.

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