

your name _____

Physics 831 Quiz #1 - Friday, Sep. 9

You may work in groups of three. Turn in one solution for the group.

1. Consider two identical (but they might have different spins) spin-1 bosons (could have spin projections $m = 1, 0, -1$) that are in one of two single-particle energy levels, 0 and ϵ .
 - (a) (2 pts) List the system energy levels and their degeneracies
 - (b) (2 pts) Calculate the average system energy as a function of the temperature
 - (c) (2 pts) Calculate the entropy as a function of the temperature
 - (d) (2 pts) What is the average energy at $T = 0$ and at $T = \infty$?
 - (e) (2 pts) What is the entropy at $T = 0$ and at $T = \infty$?
 - (f) (10 pts) Assuming a chemical potential $\mu < 0$ and temperature T , i.e. the number of particles is not fixed, find the average number of particles in the system.