Problem set 7

Due May 2, 2024

1. Based on the formula for entropy given by Equation (1) demonstrate that the entropy attains maximum when the probabilities of all states are equal.

$$S = -k_B \sum_i P_i \ln P_i \tag{1}$$

2. Based on the formula for entropy given by Equation (2)

$$S = k_B \ln \Omega \tag{2}$$

where Ω is the number of accessible states, compare the entropy of a single electron and two unpaired electrons with same spin on $3d$ orbitals.