

Solutions

2.1 C $n_F = 1/(3+1) = 1/4$; bosonic mean would be $1/(3-1) = 1/2$.

Compare the rejected options: $1/2$; $1/3$; $3/4$; 3 . Use the stated model and conditions.

2.2 C Select the two occupied states: $\text{choose}(6,2) = 15$. Ordered assignments double-count identical fermions.

Compare the rejected options: 6 ; 12 ; 21 ; 36 . Use the stated model and conditions.

2.3 0.25 . $n_B = 1/(5-1) = 1/4 = 0.25$.

2.4 True. Heat capacity differentiates energy with respect to temperature; a fixed additive constant has zero derivative.

3.1 Fermions select three of four states: $\binom{4}{3} = 4$. Bosons distribute three indistinguishable particles among four states: $\binom{3+4-1}{3} = 20$ by stars and bars. Labelled particles each choose any state: $4^3 = 64$. Award each count and exclusion/indistinguishability reasoning. Spin is already included in complete states.