Test I (28.07.04) : Review of Thermodynamics

1. - Ask yourself a question. [5]

2. - Answer the question. [5]

Test II (24.08.04) : Ensemble Formulation

Consider a thermodynamics system, in which E, N, V are allowed to vary. Write down (with justfication) the formal expression for, Z_s, the super-canonical partition function, suitable for describing this system. Express, $\langle V \rangle$ and $\langle \delta V \rangle^2$ as appropriate derivatives of Z_s. Give two examples of such a system. [9+1]

Test III (14.09.04) : Non-Interacting Particles

A three level system - Consider a system of N particles, confined within a volume V. The single particle energy levels consist of one ground state of zero energy and two degenerate excited states of energy ε.

1. Calculate the canonical partition function.

2. Calculate the probability that the (single particle) system is its ground state. Plot this as a function of T and discuss the limiting cases.

3. Calculate the average energy and entropy. Plot the average energy per particle and entropy per particle as functions of T.