

1 Entropy and Temperature

Suppose the multiplicity of a system is $\Omega(U) = CU^{3N/2}$, where C is a constant and N is the number of particles.

(a) Show that $U = \frac{3}{2}Nk_B T$.

(b) Show that $\left(\frac{\partial^2 S}{\partial U^2}\right)_N$ is negative. This form of $\Omega(U)$ actually applies to a monatomic ideal gas.