[tex81] **Ideal gas partition function and density of states**

(a) Starting from the result of [tex73] for the phase-space volume $\Omega(U, V, N)$ of a classical ideal gas ($N$ particles with mass $m$) in the microcanonical ensemble, calculate the density of microstates, $g_N(u)$, and then, via Laplace transform, the result of [tex76] for the canonical partition function $Z_N(\beta)$, where $\beta = 1/k_B T$.

(b) Starting from the canonical partition function $Z_N(\beta)$ analytically continued into the complex plane, calculate the density of state $g_N(U)$ via inverse Laplace transform.