

# 1 Entropy and Temperature

Suppose  $g(U) = CU^{3N/2}$ , 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  $g(U)$  actually applies to a monatomic ideal gas.