Assignment 6: Fluctuations and Phase Transitions

1. Calculate the rms fluctuation of the internal energy of an ideal gas. Express it in terms of the rms fluctuation of the number of particles (given by eq. (113.1)).

2. Repeat previous problem for a 2D and 3D degenerate electron gas.

3. For an ideal gas, find the rms fluctuation of enthalpy and also express it in terms of the rms fluctuation of internal energy.

4. Using eqs. (146.8) - (146.10), derive (146.11) explicitly.

5. Explicitly confirm the expansion for Ω and the result for the correlation radius given in the problem following §146.