[tex96] Density fluctuations and compressibility of the classical ideal gas

(a) Use the results of [tex94] and [tex95] to show that the variance of the number of particles in a classical ideal gas (open system) is equal to the average number of particles:

$$\langle N^2 \rangle - \langle N \rangle^2 = \langle N \rangle = \mathcal{N}.$$

(b) Use this result to show that the isothermal compressibility of the classical ideal gas is $\kappa_T = 1/p$.

Solution: