[tex49] **Pressure and mean square velocity in classical ideal gas**

A classical ideal gas consisting of N atoms of mass m is confined to a container of volume V. The gas in thermal equilibrium with the walls is described by a spatially uniform distribution of atomic positions and an isotropic distribution of velocities $f(\mathbf{v})$. Show that the pressure exerted on the container walls is

$$p = \frac{1}{3}\frac{N}{V}m\langle v^2\rangle, \quad \text{where} \quad \langle v^2\rangle = \int d^3v\, v^2 f(\mathbf{v}).$$