[tex71] **Mean free path of particle in classical ideal gas**

Given that the collision rate of particles (diameter d, mass m) in a region of volume Ω of a classical ideal gas with density n in thermal equilibrium at temperature T is $R = 2\Omega d^2 n^2 \sqrt{\pi k_B T/m}$ as demonstrated in [tex70]. show that the average distance traveled by a particle between collisions (*mean free path*) is

$$\ell = \frac{1}{\sqrt{2}\pi d^2 n}.$$