CORRECTIONS & COMMENTS

3rd Year Test:

Q1a)

Integral of n(x,t) is approximately 2l $n(x_0,t)$ so that the factor of 2l cancels from the diffusion equation.

Q1b)

V_1/τ = mean, total scattering rate for a particle of velocity V_1 in the Maxwellian distribution (ie the velocity of the other particle in the collision is integrated out)

Q1c)

n(x,t) is number density of particles between x Integration limits for semi-infinite cylinder should be 0 to infinity

Problems 2

Q1a)

Can use $\langle x^2 \rangle = 2Dt$. Numerical result incorrect.

Q1b)

Solutions off by factor $1/(2\pi)$. Choose a Fourier transform that such that the reality condition $(v_f)^* = v_{-f}$ in order to have v_f real.

Problems 1

Q1d)

Should have $\Delta N = 2 n L^2 V t$ so that the force $F_x = \Delta N \Delta p = -4 n m L^2 V v_x = - M V 4 n m L^2 v_x / M$. Then have a damped motion, $V(t) = V_0 \exp(- k t)$ so if $V(t) = V_0/2$ $t = \ln(2) / k$.