

Assignment #6    PY 542    Week of October 6–10, 2008

**Reading:** We are now discussing the Fokker-Planck equation and its relation to the Langevin equation. Pertinent readings include the relevant chapters of Van Kampen and also “On the Theory of the Brownian Motion” G. E. Uhlenbeck and L. S. Ornstein, Phys. Rev. **36**, 823 (1930).

**Problem:** Due Thursday October 16 in class.

1. Following the methods presented in lecture, solve the convection-diffusion equation:

$$\frac{\partial P(x, t)}{\partial t} + v \frac{\partial P(x, t)}{\partial x} = D \frac{\partial^2 P(x, t)}{\partial x^2}$$

for the initial condition  $P(x, t = 0) = \delta(x)$ .

Explicitly write the solution for  $P(x, t)$ , the Fourier-transform  $P(k, t)$ , the Laplace transform  $P(x, s)$  and the joint Fourier-Laplace transform.