Physics 751 Homework #7

Due Friday October 31, 11:00 am.

Note on the P-basis mentioned by Shankar **:**

In solving the one-dimensional Schrödinger equation, the potential $V(x)$ is usually a more complicated function of x than the kinetic energy is of p. The position and momentum obey the commutation relation $[x, p] = i\hbar$, and the standard approach is to write $p = -i\hbar d/dx$. However, we could equally write $x = i\hbar d/dp$, the commutation relations are satisfied, and writing the Hamiltonian in terms of p and $i\hbar d/dp$ leads to a differential equation whose solution is the p-space representation (the Fourier transform) of the usual $\psi(x)$. This is occasionally the best strategy—in particular, for a particle in a linear potential.

Shankar questions: 5.4.2, 5.4.3 (page 175) 7.5.1,2,3,4. (page 218).