

### PHGN-341 Homework Set 3

*Due Wed. 2/6/2008*

**HW Problem.** Schroeder problem 2.7, p. 55. [Assigned Fri. 1/25/2008]

**HW Problem.** Schroeder problem 2.8, p. 59. [Assigned Fri. 1/25/2008]

**HW Problem.** Schroeder problem 2.16, p. 63. [Assigned Fri. 1/25/2008]

**HW Problem.** Schroeder problem 2.22, p. 66. [Assigned Mon. 1/28/2008]

**HW Problem.** Try out the following, just to make sure these quantum ideas are familiar.

- (a) Show that  $\psi(\mathbf{r}) = e^{i\mathbf{p}\cdot\mathbf{r}/\hbar}/L^{3/2}$  is a solution of the Schrödinger equation with energy eigenvalue  $E = p^2/2m$ .
- (b) Show that  $\psi(\mathbf{r})$  is an eigenstate of the momentum operator

$$\hat{\mathbf{p}} = -i\hbar\nabla.$$

What is the associated eigenvalue?

- (c) Show that  $\psi(\mathbf{r})$  is normalized within a cubic box of side  $L$ :

$$\int_{\text{box}} \psi^*(\mathbf{r})\psi(\mathbf{r}) d^3r = 1.$$

[Assigned Wed. 1/30/2008]