

### PHGN-341 Homework Set 3

*Due Mon. 2/6/06*

**HW Problem.** Schroeder problem 2.7, p. 55. [Assigned Wed. 1/25/06]

**HW Problem.** Schroeder problem 2.8, p. 59. [Assigned Wed. 1/25/06]

**HW Problem.** Schroeder problem 2.16, p. 63. [Assigned Wed. 1/25/06]

**HW Problem.** Schroeder problem 2.22, p. 66. [Assigned Fri. 1/27/06]

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

- (a) Show that  $\psi(\mathbf{r})$  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:

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

[Assigned Mon. 1/30/06]