

PHY 6645 Fall 2001 – Homework 4

Due at the start of class on Thursday, October 4. No credit will be available for solutions submitted after 4 p.m. on Friday October 5.

Answer all questions. To gain full credit you should explain your reasoning and show all working. Please write neatly and remember to include your name on the front page of your answers.

1. A wave packet is described at time $t = 0$ by the wave function

$$(2\pi w^2)^{-1/4} \exp \left[\frac{ip_0(x - x_0)}{\hbar} - \left(\frac{x - x_0}{2w} \right)^2 \right].$$

The wave packet evolves in a region of zero potential. Explicitly calculate $\langle P \rangle$ and ΔP at an arbitrary time $t > 0$.

2. Shankar Exercise 5.2.4.
3. Shankar Exercise 5.2.6.

You may find it helpful to consult another text which discusses the square-well potential in detail. For instance, see Merzbacher Section 6.4.