

**King Fahd University of Petroleum and Minerals**  
**Physics Department**  
**Phys-212: Modern Physics**  
**Spring 2002**

**Assignment # 7**

**Date: Mon. Apr.6.2002**

**Due Date: Mon. Apr.13.2002**

I encourage group discussion, but not copying (cheating).

Problem.1. Find  $\Delta x = \sqrt{\langle x^2 \rangle - \langle x \rangle^2}$ ,  $\Delta p = \sqrt{\langle p^2 \rangle - \langle p \rangle^2}$  and  $\Delta x \Delta p$  for the ground state wave function of an infinite square well.

Problem.2. A mass of  $10^{-6}$  gram is moving with speed of  $10^{-1}$  cm/sec in a box of length 1 cm. Treating this as a one-dimensional infinite box, calculate

- a. the approximate value of the quantum number  $n$
- b. Assuming that  $\Delta x / L = 0.01$  percent and  $\Delta p / p = 0.1$  percent, what is  $\Delta x \Delta p / \hbar$  ?

Problem.3. Textbook Prob.6.25

Problem.4. Textbook Prob.6.32

Problem.5. Textbook Prob.6.33

Problem.6. Go to the following web sites and write your observations:

[http://www.phys.virginia.edu/classes/109N/more\\_stuff/Applets/sines/GroupVelocity.html](http://www.phys.virginia.edu/classes/109N/more_stuff/Applets/sines/GroupVelocity.html)

<http://www.colorado.edu/physics/2000/index.pl>

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