

# ASSIGNMENT # 3

**DUE: Tuesday, Feb. 13**

**READ: finish reading Chapter 3**

## PROBLEMS :

Chapter 3: 3.8, 3.11, 3.12, 3.13, 3.14, 3.17.

Hints/solutions:

3.8: a) Check orthogonality by computing appropriate integral, result should be zero b) Similar...

3.11: To find  $\Phi(p,t)$  use an integral similar to the one used in problem 2.22b. Result is:

$$\Phi(p,t) = \frac{1}{(\pi m \omega \hbar)^{1/4}} e^{-p^2/2m\omega\hbar} e^{-i\omega t/2}$$

For the probability computation, it is similar to problem 2.15 (which was on your final exam last semester). Result:  $P = 0.16$ .

3.12: Start with Eq. 3.55 and compute  $\langle x \rangle$  the usual way. Then use the hint in the problem and integrate by parts. Then use Eq. 2.144 to do the integration in  $x$ .

3.13: a) expand commutator, then add and subtract  $ACB$ ... b) Introduce a test function as we did in Eq. 2.50. c) Use another test function  $g(x)$  and apply the commutator to it.

3.14: Consider the commutator of  $A$  and  $B$  and expand it by using Eq. 2.51. Then use the generalized uncertainty principle in Eq. 3.62.

3.17: d) This is Ehrenfest's theorem (Eq. 1.38).

**TEST #1 – TUESDAY FEB. 20**