HW 3 Corrections:

9.14. A particle in the harmonic oscillator potential has the initial state

$$\psi(x,0) = A \left[ 1 - 3\sqrt{\frac{m\omega}{\hbar}} x + 2\frac{m\omega}{\hbar} x^2 \right] e^{-\frac{m\omega}{2\hbar}x^2}$$

where A is the normalization constant.

- a) Calculate the expectation value of the energy.
- b) At a later time *T*, the wave function is

$$\psi(x,0) = B \left[ 3 - 3i \sqrt{\frac{m\omega}{\hbar}} x - 2 \frac{m\omega}{\hbar} x^2 \right] e^{-\frac{m\omega}{2\hbar}x^2}$$

for some constant *B*. What is the smallest possible value of *T*?

9.15. A measurement of the energy of an harmonic oscillator system yields the results  $\hbar\omega/2$  and  $3\hbar\omega/2$  with equal probability. A measurement of the position (actually measurements on an ensemble of identically prepared systems) yields the result  $\langle x \rangle = -\sqrt{\hbar/2m\omega} \sin \omega t$ . Calculate the expectation value of the momentum.