Chem 540    Homework 4, due 9/23

A) Atkins 2.10, 2.13, 2.26, 2.27, 2.31, 2.32

B) Suppose I have a molecule vibrating as a harmonic oscillator, with $m=k=\hbar=1$.
   I photoexcite the molecule so that it starts in the state $\Psi = \frac{1}{2}\Psi_0 + \frac{1}{\sqrt{2}}\Psi_1 + \frac{1}{2}\Psi_2$, where $\Psi_n$ is the $n$th harmonic oscillator wavefunction.

1) Plot the wavefunction and its square at time 0, $\pi/2$, $\pi$, and $3\pi/4$. What is $<x>$ at each time?
2) Plot $<x>$ as a function of $t$ from 0 to $2\pi$
3) Suppose my initial wavefunction was $\Psi = \frac{1}{2}\Psi_1 + \frac{1}{\sqrt{2}}\Psi_2 + \frac{1}{2}\Psi_3$. How do the answers for the previous two questions differ in this case?

Note that if you want to get a numeric answer for something like $\pi/2$ in matlab, you can do this: double(pi/2)