Physics 214 **Quiz 5-1 [20 points]** **Week 6**

An electron is prepared in a superposition of two energy eigenstates, $\psi \propto (3\psi_1+4\psi_2)$. ψ_1 and ψ_2 are individually normalized wave functions, and have energies of $E_1 = 2$ eV and $E_2 = 7$ eV, respectively.

a) [4 points] Suppose you measure the electron's energy. What result or results might you obtain?

b) [6 points] What are the probabilities of the various possible results?

c) [5 points] Suppose you were to measure the energies of a large number of particles that are each described by the wave function ψ. What will be the average value of your energy measurements?

d) [5 points] Consider the time dependence. At $t = 0$, the probability density is $P(x,0)$. When is the next time that the probability density $P(x,t)$ returns to its $t = 0$ value (i.e., $P(x,t) = P(x,0)$)? You should give a numerical answer, in seconds.