Homework for Lecture Set 0

1. What do we mean by the term " probability amplitude"?
2. Give a qualitative description of the wavefunction $\psi(x)$
3. Practice writing down the terms of the electronic Hamiltonian, the one-electron operator, and the two-electron operator
4. Give a qualitative description of the inner product $\langle\chi|\psi\rangle$
5. What do we mean by base states $|i\rangle$?
6. Give a qualitative explanation for the equation $|\phi\rangle = \sum_{all\, i} |i\rangle \langle i|\phi\rangle$
7. Qualitatively explain the difference between the state vector $|\psi\rangle$ and the wavefunction $\psi(x)$
8. What is the difference between quantum mechanical operator $\hat{H}$ and algebraic operator $\hat{\mathscr{H}}(x)$?
9. Explain how we get from $\langle E\rangle_{av} = \langle\psi|\hat{H}|\psi\rangle$ to $\langle E\rangle_{av} = \int_x \psi^*(x)\hat{\mathscr{H}}(x)\psi(x)dx$