Problem Set #6 *3D, 1-particle systems*

1. A particle of mass *m* is trapped in a rectangular infinite well with side lengths $L_1 = L, L_2 = L/\sqrt{2}, L_3 = L/\sqrt{3}$. Make a table of n_x, n_y, n_z values with corresponding values of *E* for the six lowest energy eigenvalues with *E* measured in units of $\pi^2\hbar^2/2mL^2$.

Problems 2-4 refer to: An electron is trapped in a rectangular infinite well with side lengths $L_1 = L, L_2 = L_3 = L/10$. Let $L = 2$ nm.

2. What are the electron's ground state and first excited state energies (in eV). Use $\pi^2(\hbar c)^2/2mc^2L^2$, where all quantities are in eV, eV-nm, or nm.

3. What is the wavelength of the photon that is emitted when the electron in problem 2 makes a transition from the first excited state to the ground state?

4. Suppose the energy of the electron state $(n_x,1,1)$ is greater than or equal to the energy of the state $(1,2,1)$. What is the smallest value of n_x for which this is true?