1. Without looking at your book or notes, draw pictures of the following atomic orbitals. Don't forget to show the phases.

\[
\begin{align*}
\text{p}_y & \quad \text{d}_{yz} & \quad \text{d}_{x^2-y^2} \quad \text{d}_{z^2}
\end{align*}
\]

2. The energy levels for the particle in a box are given by the following equation:

\[
E = \frac{n^2 \hbar^2}{8mL^2}
\]

One could use this equation to model a real system. Suppose we did that and we used it for a 1 electron system.

a. Write an equation that would give us the wavelength of light needed to promote the one electron from the ground state to the first excited state.

b. If the box was made twice as long what would happen to the wavelength of the light?

9. How many nodes, radial, planar and total would you find for each of the following atomic orbitals.

a. 3s  b. 5p  c. 4d  d. 5f  e. 6g

3. Write a one or two sentence statement explaining the following periodic trends.

a. How does the size of an atom depend upon the atomic number.

b. How does the ionization energy of an atom depend upon the atomic number.

c. What is the relationship between ionization energies and atomic size.

4. For each of the following indicate which is the larger atom or ion.

a. Li or F

b. Li or Cs

c. Na⁺ or Cl⁻

5. What is the difference between electronegativity and electron affinity.