Discussion Problems
(spatial extent of atomic orbitals)

Dr. Gutow's Atomic Orbital Viewer is designed to compare multiple orbitals by displaying them simultaneously on one atom. This tool lets you visualize the relative sizes of atomic orbitals (i.e., spatial extent). http://www.uwosh.edu/faculty_staff/gutow/Orbitals/Cl/Cl_AOs.shtml

1) Give the approximate diameter ratio of the 1s:2s:3s orbitals

2) Approximating the $2p_x$ orbital as a cylinder, give its height:width ratio

3) How much taller is a $2p_x$ orbital relative to a 2s orbital? Give your answer in percent (e.g., the $2p_x$ orbital is ___% taller than the 2s orbital).

4) How much wider is a 2s orbital relative to a $2p_x$ orbital? Give your answer in percent (e.g., the 2s orbital is ___% wider than the $2p_x$ orbital).

5) Display the 2s orbital as a mesh surface. Notice that near the nucleus, two meshes of opposite color are nearly superimposed. Explain why by drawing a plot.

6) For the 2s orbital, how many times larger is the outer isosurface relative to the inner isosurfaces? What about the 3s?

Use electron density plots on the Orbitron web site to answer the following question:
http://winter.group.shef.ac.uk/orbitron/AOs/2s/e-density.html

7) Does the 2s or 2p orbtial have greater electron density near the nucleus?