1. (a) Taking a positively-charged particle, having a charge of +7 and seven negatively-charged particles, each having a charge of –1, define all representative planar configurations which would result in no net electrostatic force being exerted on the positive charge. **Note:** Configurations having the same basic geometric pattern and differing only in the “r” distance between the positive and negative charges should not be considered new configurations. Recognize also that this is meant to be a qualitative problem and does not require detailed numerical calculations.

(b) Perform the same exercise as in part (a), however, in this case consider all possible stable configurations in 3-D space.

(c) Of all possible configurations considered in (a) and (b), which ones would you consider to be the most stable and why? If you need to make any assumptions or specify boundary conditions in providing your answer, please state them. **Note:** In comparing different configurations, use the same value for “r” whenever possible.

2. Develop a complete set of quantum numbers (recall the exercise we completed using the overhead projector) for the following atomic species: Kr, Al, and Rb

3. Write electron configurations for each of the following species: Cu, P, Cl’, Pd, and Ca²⁺. If there are any unusual configurations provide an explanation.

4. In our discussions of the atomic nucleus, we concluded that it was made up of protons and neutrons. Based on our electrostatic discussions, however, it would appear that the nucleus should be very unstable due to the repulsion between the positively-charged protons. Explain the fact that the nucleus is, for the appropriate mixture of protons and neutrons, quite stable.

7. Calculate the wavelength of a golf ball smacked off the tee by Tiger Woods.