1. Consider the diatomic molecule CN.
   a. Draw a MO energy level diagram for the diatomic molecule CN.
   b. Draw pictures of each MO.
   c. What is the bond order?
   d. What would the bond order be for CN\textsuperscript{+} and CN\textsuperscript{-}?
   e. Which of these species would be paramagnetic?

2. Consider the pentadienyl anion - . The molecule has five carbons in a row with six electrons in its $\pi$ system.
   a. Draw all the important resonance forms of the pentadienyl anion.
   b. Which atoms get the negative charge?
   c. Draw a molecular orbital energy level diagram for the pentadienyl anion.
   d. Show which levels contain electrons.
   e. Draw a picture of each MO.
3. Consider the cyclopentadienyl anion - . The molecule has five carbons in a row with six electrons in its $\pi$ system.

   a. Draw all important resonance forms of the cyclopentadienyl anion.
   b. Which atoms get the negative charge?
   c. Draw a molecular orbital energy level diagram for the pentadienyl anion.
   d. Show which levels contain electrons.
   e. Draw a picture of each MO.
   f. Is the cyclopentadienyl anion aromatic?

4. Show how you would combine a 2s and a 2p orbital to get a pair of sp hybrids. Give an equation for each and pictorial representation.

5. Identify the hybridization of each of the non-hydrogen atoms in the following molecule.