1. For each of the following; draw the Lewis structure, determine the hybridization of the central atoms, determine the bond angles, and describe the bonds (sigma vs. pi and which orbitals are involved).
   a. HCN
   
   b. HCONH₂

2. Fill in any missing formal charge(s) on the molecule below. Assume each atom has a complete octet.
3. Convert the following Lewis structure into a condensed structure and a skeletal structure.

4. Convert the following skeletal structure into a condensed and Lewis structure.
5. Draw the following orbital before and after overlap. Label the nodes if any.
   a. $\sigma_{1s}$
   
   b. $\sigma_{1s^*}$
   
   c. $\sigma_{2p}$
   
   d. $\sigma_{2p^*}$
   
   e. $\pi_{2p}$
6. Predict the relative lengths and strengths of the bonds in the following:
   a. chloromethane (CH₃Cl), bromomethane (CH₃Br) and iodomethane (CH₃I)

   b. ethane (C₂H₆), ethene (C₂H₄) and ethyne (C₂H₂)

7. Describe the fundamental differences between a methyl cation, methyl anion and methyl radical.
8. Use the following structure to determine the following:

![Chemical Structure]

a. What is the chemical formula?

b. How many sp³ carbons are in this molecule?

c. How many sp² carbons are in this molecule?

d. How many quaternary carbons are in this molecule?

e. How many degrees of unsaturation?

f. What type of amine is indicated by the arrow?

g. What is the hybridization of the nitrogen with an asterisk?
9. Do all of the carbons lie on the same plane for the molecule CH$_3$CCH?

10. Do all of the hydrogens lie on the same plane for the molecule CH$_3$CCH?