1. Propose reasonable Lewis-dot structures for the following. There may be more than one correct answer.
   a) $\text{H}_2\text{CO}_2$  
   b) $\text{HNO}_3$  
   c) $\text{N}_2\text{O}$  
   d) $\text{NH}_3\text{O}$  
   e) $\text{C}_2\text{H}_3\text{ClO}$  
   f) $\text{C}_2\text{H}_5\text{NO}$

2. Identify the hybridization of each atom other than H and Cl in the compounds above.

3. Draw $\text{NO}_2^+$ and $\text{NO}_2^-$. Which ion has a “localized” charge and which has a “delocalized” charge. Explain (resonance, see Wade 1-9)).

4. Propose a structure of a hydrocarbon with 4 carbons that has 2 $\text{sp}^2 - \text{sp}$ $\sigma$ bonds.

5. BF$_3$ is non-polar and NF$_3$ is polar despite the fact that the B-F bond has significantly greater bond moment than the N-F bond. Explain (see Wade, 2-9).

6. Draw an orbital depiction of acrylonitrile. Label all bonds ($\pi$ or $\sigma$) and orbitals (e.g. $\text{sp}^3$).

   ![Acrylonitrile](image)

   acrylonitrile

7. Determine the molecular formula of the following compounds:

   a) ![Aromatic Ring](image)
   b) ![Alkenes](image)
   c) ![Cycloalkane](image)
   d) $(\text{CH}_3)_2\text{CHCH}_2\text{CH(Ch}_3\text{)CH}_2\text{C(Ch}_3\text{)}_3$

   draw this compound in zig-zag form