Lewis Structures, Formal Charges and Resonance
Refer to Sec. 8.8-8.10 in Moore, Stanitski, Jurs and also try #104-116 (bold) p.381.

1) Draw the Lewis dot symbol for
   a. Br  
   b. Ca  
   c. O^{2-}  
   d. Xe  
   e. C^{2-}  
   f. Al^{3+}  

2) Draw Lewis Structures for the following and assign formal charges as appropriate (which means, if the formal charge is not zero for an atom, show it!):
   a. CBr_{4}  
   b. O_{2}^{2-}  
   c. NH_{3}  
   d. NO^{+}  
   e. IO_{3}^{-}  

3) Oxalic acid, H_{2}C_{2}O_{4}, is a poisonous substance found in uncooked spinach leaves. Draw its Lewis structure.

4) Write Lewis structures for the following showing all resonance structures. Assign formal charges as appropriate.
   a. N_{2}O (N is the central atom)  
   b. SO_{2}
5) Based on the formal charges assigned in the previous problem, decide which resonance structure is preferred (if any).

6) Assign formal charges to the atoms in the following structures. Which of the two do you think is the more important structure?

\[ \begin{array}{c}
\text{N} \quad \text{C} \quad \text{O} \\
\text{N} \quad \text{C} \quad \text{O}
\end{array} \]

7) Fill in the missing lone pairs. Assign formal charges to ALL atoms in this Lewis structure. Suggest a better resonance structure for this molecule.

\[ \text{O} \quad \text{H} \]
\[ \text{O} \quad \text{As} \quad \text{O} \quad \text{H} \]
\[ \text{O} \]
\[ \text{H} \]

8) Place the species below in order of shortest to longest nitrogen-oxygen bond. (Hint: Consider the best resonance structure, but also consider other possible contributing resonance structures and how they might affect the N—O bond order).

\[ \text{H}_2\text{NOH} \quad \text{N}_2\text{O} \quad \text{NO}^+ \quad \text{NO}_2^- \quad \text{NO}_3^- \]