1. (5 points) Write the condensed electron configuration for each of the following species.
   
   a. Ir
   
   b. Es
   
   c. Ga
   
   d. Al$^{3+}$
   
   e. Se$^{2-}$

2. (4 points) Give all possible values of $n$, $R$, $m_R$, and $m_s$ for a 4p electron.

3. (4 points) Electron affinity generally increases as one moves from the left to the right across the periodic chart, though there are exceptions. As an example of an exception, the electron affinity for Mg is lower than that for Na. Using electron configuration arguments explain why this exception might occur.
4. (17 points) Determine the formal charge for each atom in each of the following species. (Note this will require drawing the Lewis structures.)

   a. CO

   b. $\text{SO}_3^{2-}$

   c. $\text{NH}_4^+$

   d. $\text{NO}_2^-$

   e. HCN
5. (28 points) Complete the following table as indicated.

<table>
<thead>
<tr>
<th>Species</th>
<th>Lewis Structure</th>
<th>Electron-domain geometry</th>
<th>Molecular geometry</th>
<th>Hybridization about Central Atom</th>
<th>Polar or nonpolar molecule?</th>
<th>Resonance exists? (Yes or No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO$_3$</td>
<td></td>
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<tr>
<td>H$_2$S</td>
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<tr>
<td>ClO$_3^-$</td>
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<tr>
<td>BClF$_2$</td>
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</tbody>
</table>