Lewis Structures, Geometry and Hybridization

1. How many valence e- does each of the following have? How many bonds does each of the following tend to form in compounds? How many lone pairs does each of the following have?

<table>
<thead>
<tr>
<th></th>
<th># valence e-</th>
<th># bonds formed (a.k.a. valence)</th>
<th># lone pairs</th>
<th>Sum valence e- and # bonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>d.</td>
<td>C</td>
<td></td>
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</tr>
</tbody>
</table>

2. Draw the Lewis structures for each of the following
   a. N₂H₄
   b. CO₂
   c. HNO₃
   d. CH₃N₂⁺
   e. H₂NO⁻

3. Calculate the formal charge on each atom in each of the structures in #5.
   a. N₂H₄
   b. CO₂
   c. HNO₃
   d. CH₃N₂⁺
   e. H₂NO⁻

4. Give the hybridization of the central atom in each of the following species as well as the bond arrangement/geometry (linear, trigonal planar, tetrahedral, bent, etc).
   a. HNO₃
   b. CH₃⁻
   c. H₂NO⁻
   d. CH₃⁻
   e. CO₂

5. Assign hybridization to the indicated atoms, give the molecular geometry and predict the bond angles.

6. Indicate whether each of the following molecules is polar or nonpolar.
   a. SO₃
   b. SO₂
   c. H₂CO
   d. BCl₃
   e. CH₂Cl₂