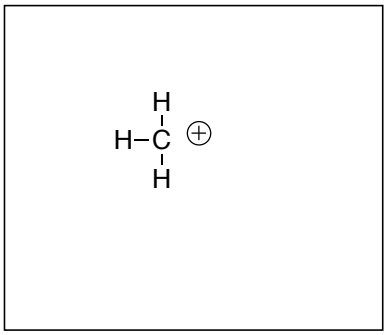
CHE 171
Fall, 2005
Quiz 1 Answer Key

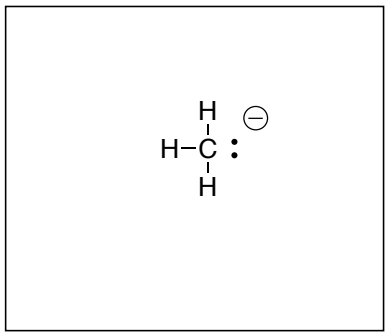
Name_____
Section: **101** **102** **103**
M W F
(circle one)

1. Carbocations and carbanions are common intermediates in organic reactions. The simplest carbocation is $[CH_3]^+$ and the simplest carbanion is $[:CH_3]^-$.

   (a) Draw Lewis structures for $[CH_3]^+$ and $[:CH_3]^-$ in the spaces provided below: (10 pts)

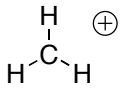


$[CH_3]^{\oplus}$



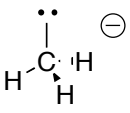
$[:CH_3]^{\ominus}$

   (b) What is the geometry of the $[CH_3]^+$ ion? Illustrate with appropriate bond angles and describe below. (5 pts)



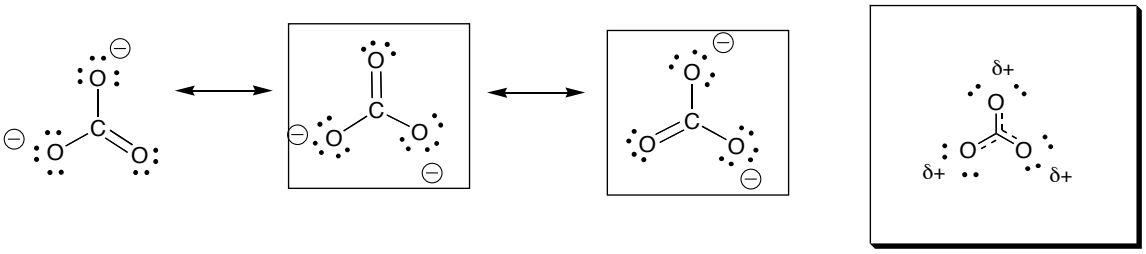
geometry = trigonal planar
bond angles = 120°

   (c) What is the geometry of the $[:CH_3]^-$ ion? Illustrate with appropriate bond angles and describe below. (5 pts)



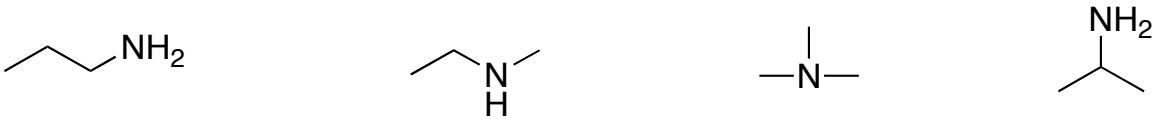
geometry = tetrahedral
(shape = pyramidal)
bond angles = 107° (slightly less than for a perfect tetrehedron b/c lone pair takes up more room than bonding electrons)

2. Draw two additional resonance structures for the following anion. Then draw the resonance hybrid. (10 pts)



Hybrid

3. Draw four constitutional isomers with molecular formula C_3H_9N. (8 pts)



(*See Smith Problem 1.39c)*

4. Acetylene is an organic compound that is a gas at room temperature. The molecular formula of acetylene is C_2H_2. Show a Lewis structure for acetylene. Explain (or illustrate) what types of orbitals are used to form the carbon-carbon bond of acetylene. (12 pts)