CH 221 Exam Prep II Worksheet Name: _____

Worksheet due dates: **Mon, 11/10, 1:10 PM** *(L1)* **, Tue, 11/13, 8:30 AM** *(L2) ,* **Wed, 11/12, 1:10 PM** *(L3)* ***or*** **Fri, 11/14, 1:10 PM** *(L4)*. To complete, show ***detailed*** *steps* on how to get the given answer for each problem. *Failure to use this form for work and answers will result in a point penalty.*

Problem 1: One of the following species could probably not exist as a stable molecule as predicted by Lewis structures. Draw the structures and **explain why one of them is an improbable structure**.

NH_3, N_2H_2, N_2H_4, N_2H_6, N_2O_4

Answer to Problem #1: **N_2H_6**

Problem 2: **Draw** the molecular orbital description of the NO^{-1} anion. Is NO^{-1} paramagnetic? What is the bond order for NO^{-1}? Is NO^{-1} isoelectronic with CO? **Define isoelectronic to receive credit.**

Answer to Problem #2: **NO^{-1} is paramagnetic, has a bond order = 2 and it is not isoelectronic with CO.**

Problem 3: Which of the following does not have a tetrahedral electron pair geometry (EPG)? **Draw Lewis structures for each molecule and provide the EPG and MG of the non-tetrahedral species.**

NCl_3, H_2O, $GeBr_3$, SeF_4

Answer to Problem #3: **SeF_4**

Problem 4: What is the molecular geometry (MG) for the following structure: **BeF_3^{-1}** (draw the structure to get credit!)

Answer to Problem #4: **trigonal planar**

Problem 5: Draw a Lewis structure for CCl_4. Describe the EPG, MG and bond angles. Calculate the change in electronegativity ($\Delta\chi$) for the C-Cl bond using the table in problem set #4. Does this molecule have polar bonds? Is the molecule polar?

Answer to Problem #5: **CCl_4 is tetrahedral (EPG and MG) with 109° angles. $\Delta\chi$ = 3.0 - 2.5 = 0.5; the bonds are polar, the molecule is nonpolar.**