HOMEWORK ASSIGNMENT #3 ORGANIC CHEMISTRY I (22 pts)

Non-mathematical MO theory; drawing and naming alkanes

**(due Monday 17 September 2012)**

**Your name:\_\_\_\_\_\_\_\_answers\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 pt**

3.1 a) Draw the MO diagram for NO on a separate piece of paper (3 pts) *see back page*

b) How many net bonds are predicted ? \_\_\_\_\_2.5\_\_\_\_\_\_\_\_\_\_ (can be non-integer)

c) Will NO be paramagnetic ? YES NO

3.2 Despite its’ mathematical complexity, general MO theory dominates modern chemical thinking.

What is the main advantage of the approach? (1 pt)

*Provides good numerical estimates of energies, bond lengths, angles and electronic distributions*

3.3 Draw the abbreviated bondline forms for the alkanes drawn, written or named below

a) b) CH3CH(CH3)(CH2)4CH3









c) 2,3,3-trimethylhexane d)





3.4. Draw out all the possible structural isomers of C5H12 and name them according to IUPAC rules

(6 pts)

pentane 2-methylbutane 2,2-dimethylpropane



3.5. Identify the functional group family drawn or supply an example of the functional group requested:





2-hex**ene**



\_ketone\_\_\_\_\_\_ alkene \_\_alcohol\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Propanoic acid





Ethyl amine

carboxylic acid \_\_alkyl halide or haloalkane amine

MO diagram for NO

3 BONDS -1/2 ANTIBOND = 2.5 NET BONDS

\_\_\_\_\_\_ 2pσz\* antibond

\_\_\_\_ \_\_\_\_\_ (2pπx\* and 2pπy\*) anti bonds ½ antibond

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\_\_\_\_ \_\_\_\_\_ (2pπx and 2pπy) bonds

\_\_\_\_\_\_ 2pσz bond 3 bonds

\_\_\_\_\_ 2σs\* anti bond

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\_\_\_\_\_ 2σs bond

\_\_\_\_\_ 1σs\* anti bond sums to non-bonds

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\_\_\_\_\_\_ 1σs bond

N + O = 7 + 8 = 15 electron system