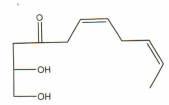
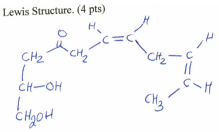
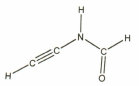
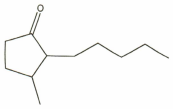
1. Convert the following from Line Bond Notation to a Lewis Structure. (4 pts)

2. Convert the following Lewis Structure to Line Bond Notation. (4 pts)



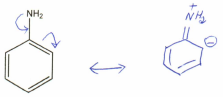

3. Give the official IUPAC name of the molecule shown below. (4 pts)



3-methyl-2-pentylcyclopentanone

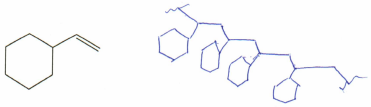
4. Fill in all missing non-zero formal charges on the molecule shown below. (4 pts)

5. Draw a resonance structure for the molecule shown below. If your resonance structure has any formal charges, be sure to show them clearly. (4 pts)

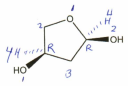


6. Two resonance forms of the same molecule are shown below. Draw arrows to show how the structure on the left would covert to the structure on the right and how the structure on the right would covert to the structure to the left. (4 pts)

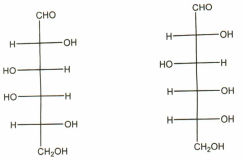
7. Draw the structure of the polymer that would form upon polymerization of the following alkene with itself. (4 pts)



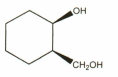
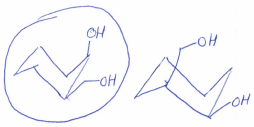
8. Determine the R/S configuration of each chiral center shown below. Make sure to clearly indicate the priority (1, 2, 3 or 4) of each group attached to the chiral carbon. (4 pts)



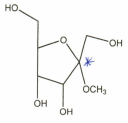
9. What is the relationship between the following two molecules? Are they unrelated, constitutional isomers, identical, enantiomers or diasteriomers? (2 pts)



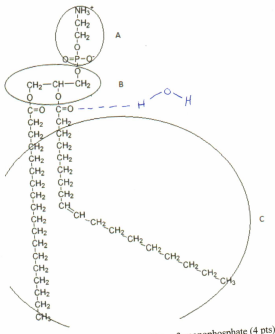
10. Draw both chair conformations of the following cyclohexane compound and circle the one that is lower in energy. (8 pts)

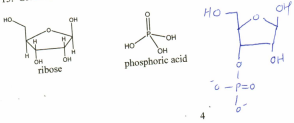
11a. Label the anomeric carbon on the sugar shown below. (6 pts) 2
b. Is the anomeric carbon alpha or beta? alpha 2
c. Is this a reducing sugar? no 2



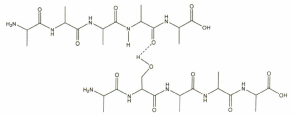
12. a. What type of lipid is shown below: a fat, steroid, glycolipid or phospholipid? (6 pts)
b. Different parts of the lipid have been labelled A, B and C. Which parts of the lipid are hydrophobic?
c. Which parts of the lipid are capable of hydrogen bonding to a water molecule?
d. Show an example of a hydrogen bonding – draw a water molecule and depict how it would hydrogen bond to a *specific location* on the lipid.



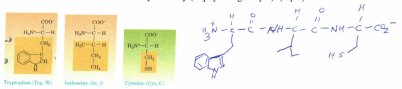
13. Given the structures below, draw ribose-3-monophosphate (4 pts):



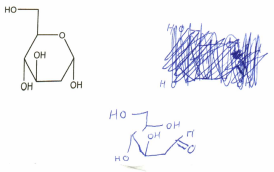
14. a. What type of intermolecular interaction is depicted below? (4 points)
b. Does this interaction affect primary, secondary or tertiary structure?



15. Construct the **tripeptide** TRP ILE CYS from the amino acids shown below. Make sure to draw it in the form it would take in your body (at physiological pH). (8 pts)



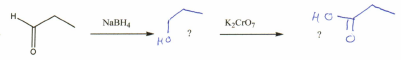
16a. Is the compound below an acetal or a hemiacetal? (6 pts)
b. Draw the structures of the aldehyde and alcohol(s) that were used to synthesize this compound:



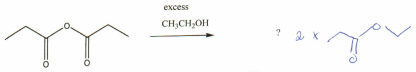
17. Fill in the missing reagent(s) or products in each of the reactions shown below (24 pts)

a.

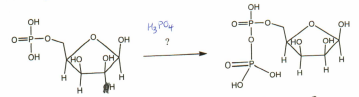
b.



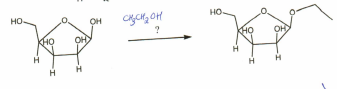
c.



d.



e.



f.