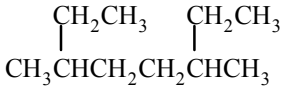
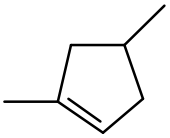
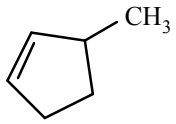
Chemistry 321 **Name** _____
Final Exam **Student ID** _____

1. [15 pts] Give the IUPAC name of the following compounds.







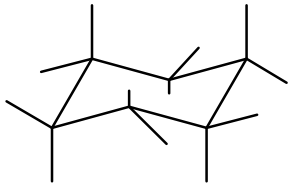
_____ _____ _____

2. (10 pts). How many stereoisomers are possible for 2,3-dibromobutane. Explain your answer.

3. [15 pts] Draw the structure of the following compounds.

a) *cis*-1,2-dimethylcyclopentane

b) *trans*-1,4-dimethylcyclohexane
(**draw MOST STABLE chair form**)



c) (Z)-3-bromo-3-heptene

4. (15 pts) Write an overall equation to demonstrate the free-radical chlorination of 2,3-dimethylbutane. Include conditions and the production of the **major** organic product

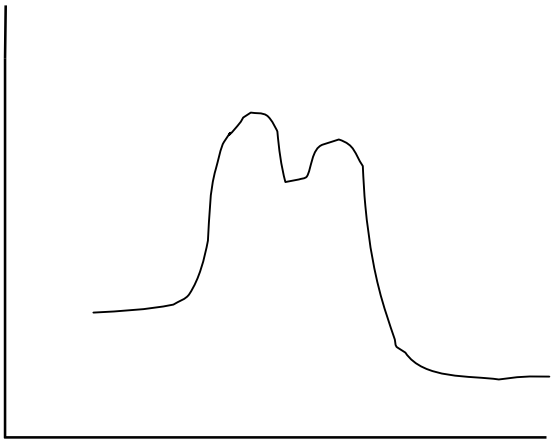
b. How many products are possible? _____

5. (10 pts) Acid HA has a pKa = 20; acid HB has a pKa = 10. If NaA is added to HB, will the position of equilibrium lie to the right or left. Explain your answer.

6.[10 pts] Draw the following structures.

a) An acid <u>and</u> an ester, each having the molecular formula $C_3H_6O_2$.

7. (24 pts) Use the following diagram to answer the following: (Positions refer to I, II, III, IV, V)



What does I represent in the diagram _____

What does II represent in the diagram? _____

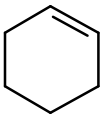
Which position(s) in the diagram represent(s) (an) intermediate(s)? _____

Which position(s) in the diagram represent(s) (a) transition state(s)? _____

Is the reaction endomermic or exothermic. _____

The difference in energy between which two points represents the energy of activation ?
_____

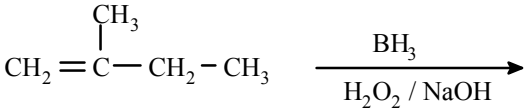
For the following reaction, what are the appropriate structures at III, and V?

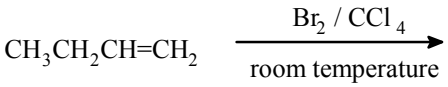
 + HBr

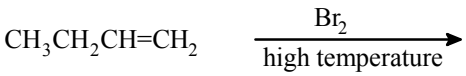
_____ _____
III V

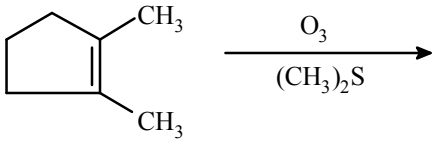
8. (10 POINTS) Draw a Newman projection representing the **<u>most stable</u>** conformation of 1-bromo-2-methylpropane (as viewed along C_1 to C_2)

9. [25 pts] Draw the major organic product in each of the following reactions (5 points each).



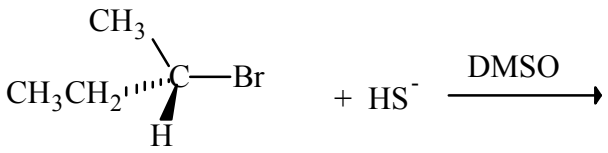






10. (15 pts) For the **elimination** reaction of 2-bromo-3-methylbutane with $CH_3CH_2O\text{-}K^+$ in CH_3CH_2OH, write an equation showing this reaction . **Include all possible products**. Circle the major product.

11. (15 pts) Give the product(s) expected in the following reaction. Indicate if the mechanism is S_N1 or S_N2. **Indicate the stereochemistry for the product(s)**



12. (16 pts) Starting with **ethane**, show how you would produce an **alcohol**. you may use reagents, solvents, conditions, as necessary. You must write chemical equations showing valid reactions.