

NAME (Print): _____

SIGNATURE: _____

Chemistry 320M/328M
Dr. Brent Iverson
3rd Homework
September 13, 2022

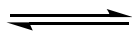
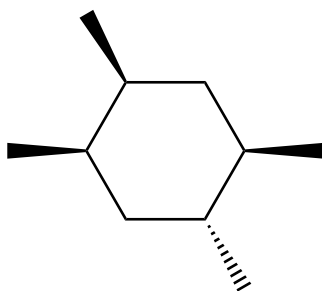
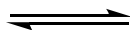
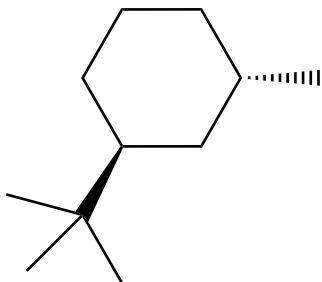
Please print the
first three letters
of your last name
in the three boxes

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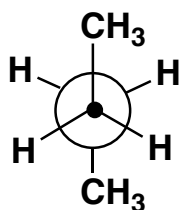
Score: _____

(Please include this as the second page of your homework problem set)

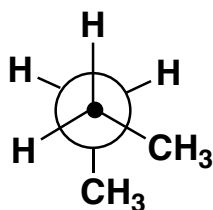
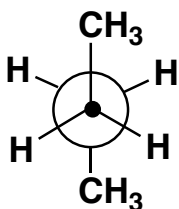
1) (7 pts each) Draw the alternative chair conformations of the following cyclohexane derivatives. When there is a difference in energy, circle the more stable chair conformation (i.e. the one that predominates at equilibrium).



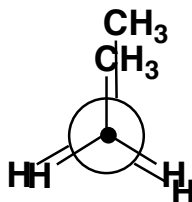
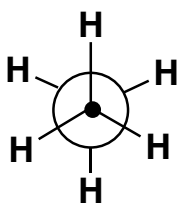
2. (4 pts each) For each pair of molecules, circle the one that has LESS STRAIN, then put an "X" in the box under all the types of strain that explain(s) your answer:



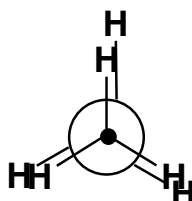
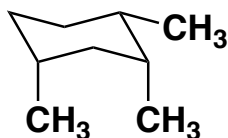
vs.

Angle
strain☐Torsional
strain☐Steric
strain☐

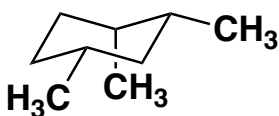
vs.

☐☐☐

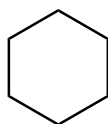
vs.

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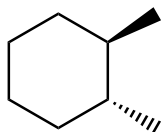
vs.

☐☐☐

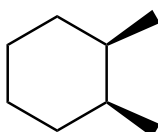
vs.

☐☐☐

3. (4 pts) Think about this last one, which one will have the most stable single conformation?



vs.

☐☐☐

4) (2 pts each) Fill in the blanks with the words that best complete the following sentences.

_____ strain is the term used to explain that eclipsed conformations of ethane are less stable than staggered conformations. For butane, the most stable conformation is the staggered, anti conformation because this conformation minimizes _____ strain between the methyl groups.

Large groups on cyclohexane molecules prefer to be equatorial primarily because of

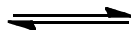
_____ strain. Another name for this kind of strain is a _____ interaction.

When two groups are on the same side (face) of a cycloalkane, they are described by the following term _____ .

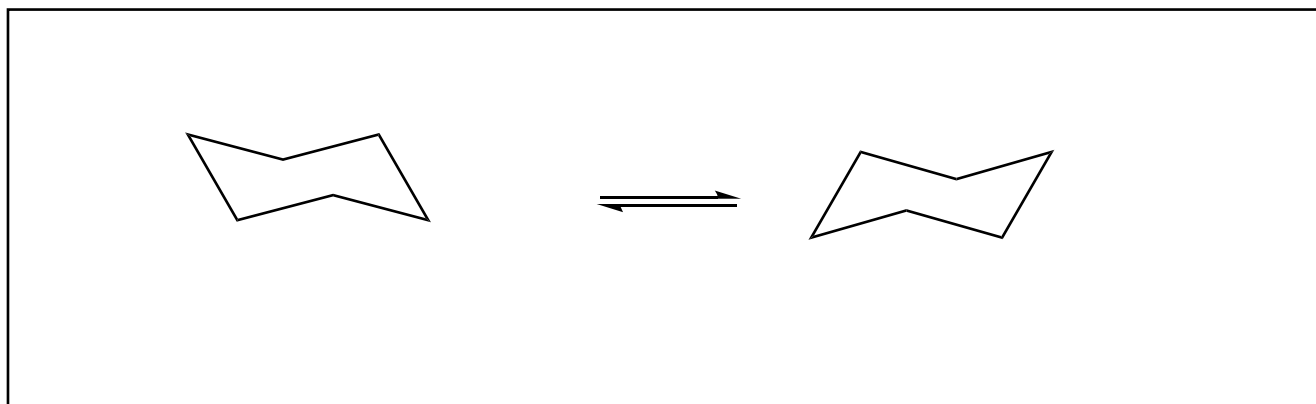
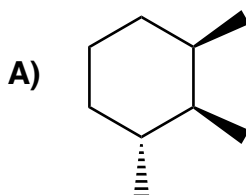
When two groups are on the opposite side (face) of a cycloalkane, they are described by the following term _____ .

Cyclobutane has considerably more _____ and _____ strain compared to cyclohexane.

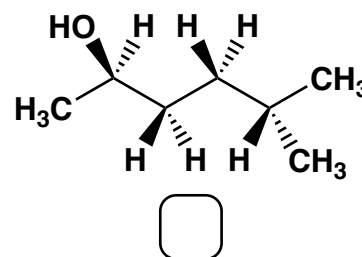
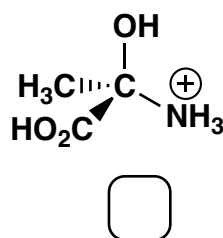
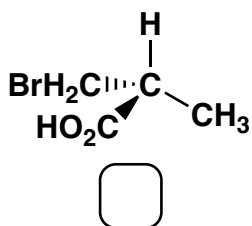
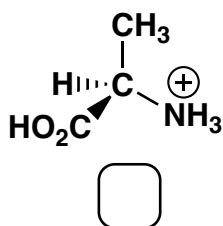
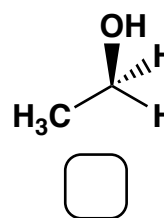
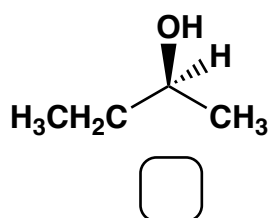
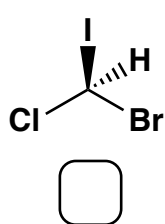
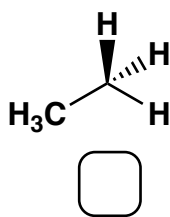
5) (7 pts) Draw the alternative chair conformations of *trans*-1,4-diethylcyclohexane. Draw a circle around the one that is more stable, i.e. the one that predominates at equilibrium.



6. (7 pts) For the following cyclohexane derivative, draw the two alternative chair conformations. If there is a difference in stability, draw a circle around the more stable conformation. If there is not any difference in stability, do not circle either chair form.



7. (2 pts each) Examine the following structures. For each molecule with a chiral center, assign the stereochemistry then write "R" or "S" as appropriate in the box provided below each structure. For all molecules that have no chiral centers, leave the box blank.



8. (6 points each) Write the structure that corresponds to the following IUPAC name:

(3*S*,4*R*)-3,4-dimethylheptane



Write the IUPAC name for the following molecule, including the use of “R” or “S” for all chiral centers.

