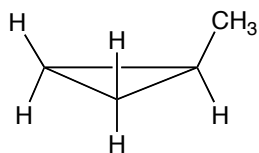
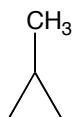
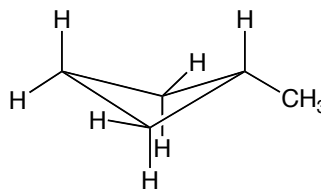
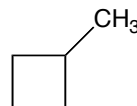


Answers to Problem Set #5

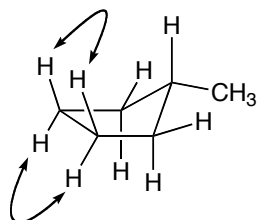
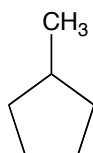
Question 1. Draw methylcyclopropane, methylcyclobutane, methylcyclopentane, and methylcyclohexane in three dimensions in their most stable conformer (if applicable). Identify whether any of the substituents for each ring system are in eclipsing conformations.



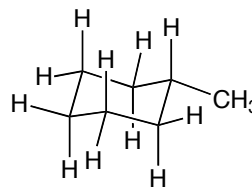
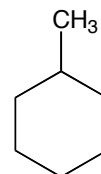
*no other conformation possible
all substituents are eclipsing*



*puckered ring conformation reduces eclipsing interactions
methyl group in "equatorial-like" position
no substituents are eclipsing (but not perfectly staggered either)*

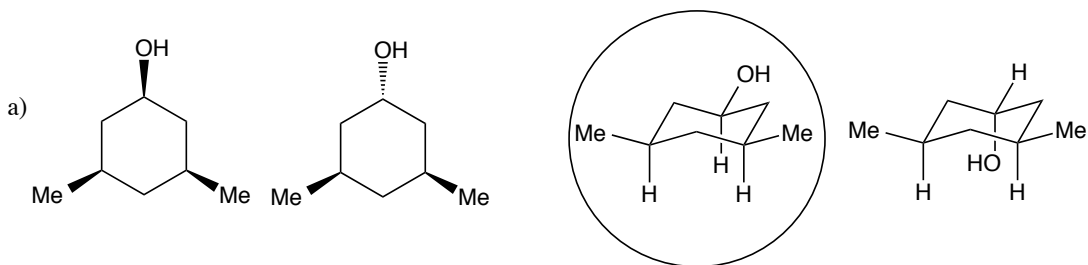


*envelope conformation preferred
methyl group in "equatorial-like" position
hydrogens are eclipsing as shown*

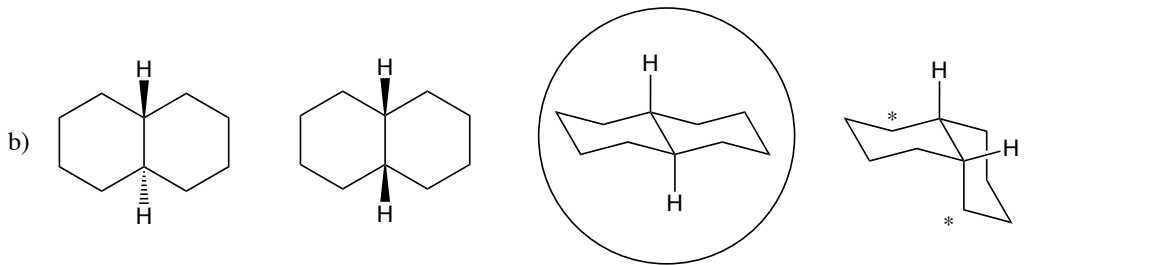


*chair conformation preferred
methyl group in equatorial position
no eclipsing interactions*

Question 2. Draw each of the following compounds in three dimensions in their lowest energy conformations. Then, circle the **more stable** compound from each pair and give a brief explanation for your answer.



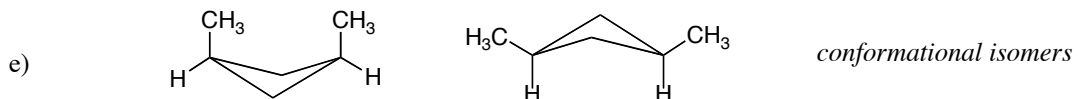
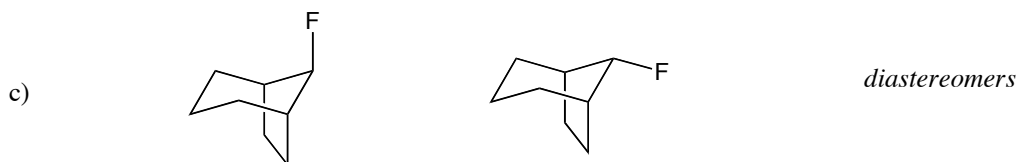
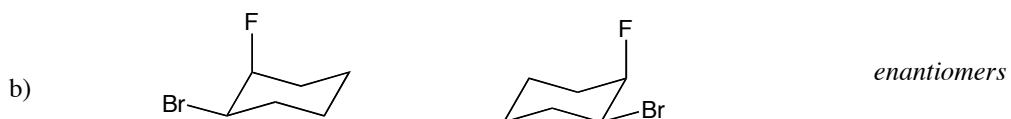
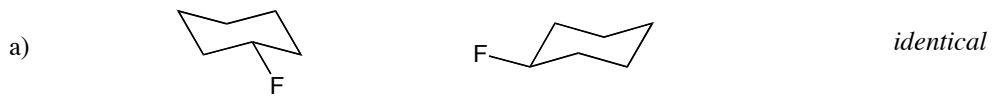
all substituents equatorial

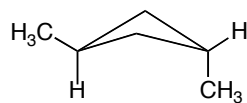
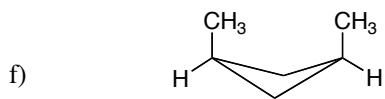
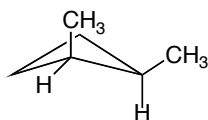
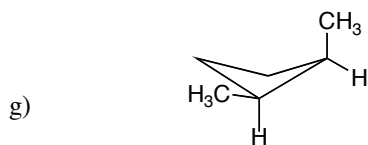
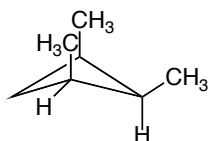
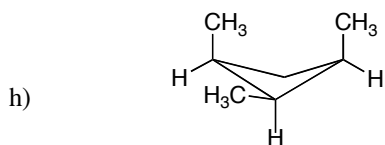
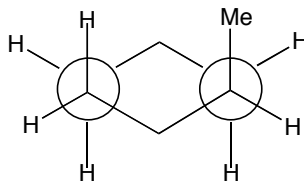
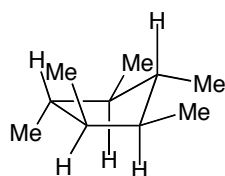
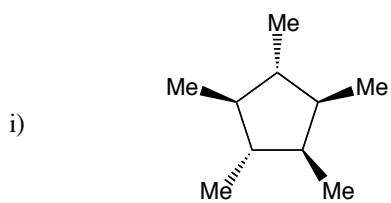


all substituents equatorial

*The carbons marked with a * are axial to the opposite ring*

Question 3. For each of the following pairs of molecules, determine how they are related (i.e. enantiomers, diastereomers, structural isomers, conformational isomers, or identical).



*diastereomers**conformational isomers**identical**identical**identical*

Question 4. Determine whether the following molecules are chiral (at room temperature). For each chiral compound, draw the enantiomer. For each achiral compound, explain why it is achiral (internal mirror plane, no stereocenters, etc.).

