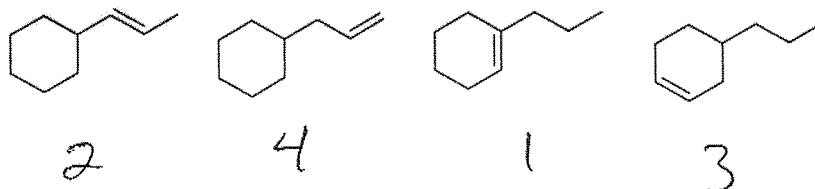JASPERSE   CHEM 341   TEST 3   VERSION 3
Ch. 6 Alkenes: Structure and Reactivity
Ch. 7 Alkenes: Reactions and Synthesis
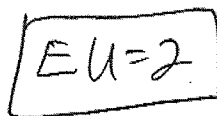The number of points per problem is indicated in parentheses following each problem.

1. Rank the following alkenes in order of stability, 1 being most stable, 4 being least stable. (4)
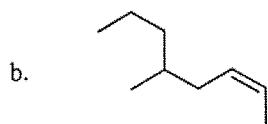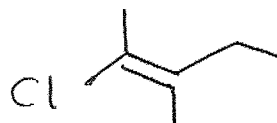

$$2 \qquad 4 \qquad 1 \qquad 3$$

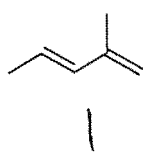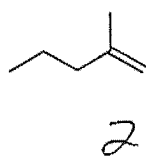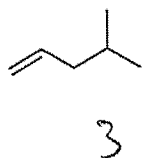2. Determine the number of elements of unsaturation for C_5H_7ClO. (3)

$$\boxed{EU=2}$$

3. Give the proper IUPAC name or the structure for the following compounds. (4 points each)

a. (E)-2-chloro-3-methyl-2-pentene

b.

cis- 5- methyl-2-octene
or Z-

4. Rank the reactivity of the following alcohols towards HBr, 1 being the fastest reactant, 3 being the slowest reactant. (3 points)


$$3 \qquad 2 \qquad 1$$

Cation stability

5. Predict the __major__ product for the following reactions. You needn't bother to show any side products or minor products. Pay careful attention to orientation. (3 points each)

H_2O, H^+

1. $Hg(OAc)_2$, CH_3OH

2. $NaBH_4$

potassium

tert-butoxide
(KOCMe$_3$)

H_2SO_4, Δ

HO
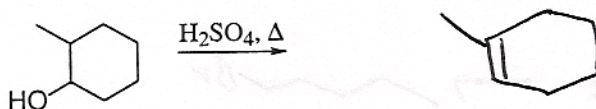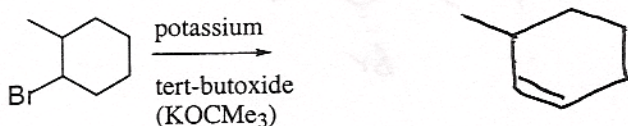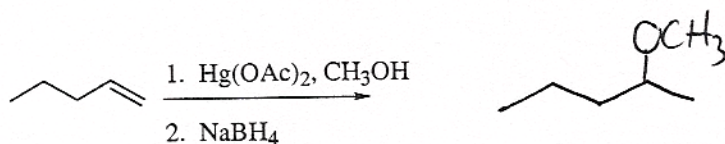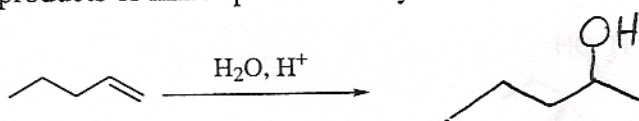
6. Predict the __major__ product in each of the following reactions. Pay careful attention to stereochemistry! (3 points each)

H_2, Pt

CH$_3$ H H CH$_3$ cis

Br_2

Br Br trans

Cl_2, H_2O

OH Cl CH$_3$ trans

OsO_4, H_2O_2

OH OH cis

2
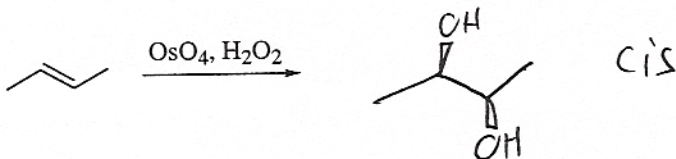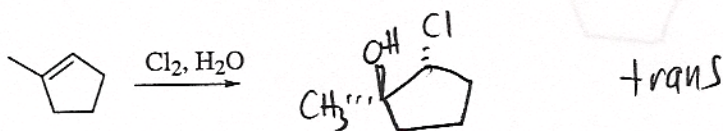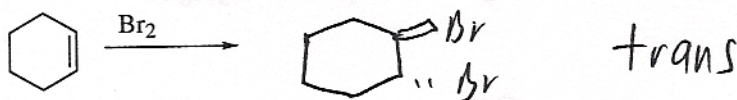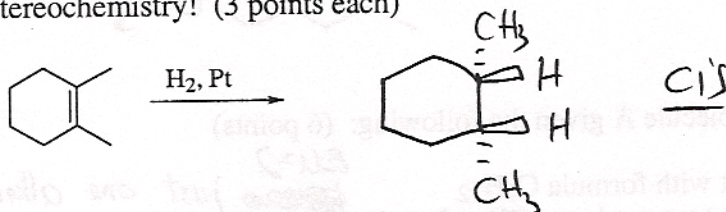
7. Fill in the starting reactant. (4 points each)

[structure box with alkene] $\xrightarrow[H_2O]{CH_3CO_3H}$ [product with H, OH stereochemistry]
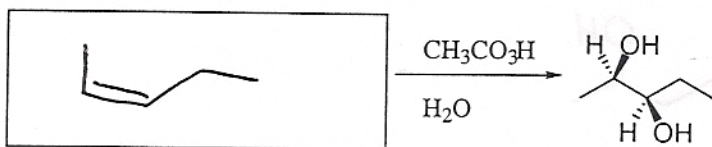
8. Provide the major product of the following reaction sequences. (4 points each)

[structure with OH]
1. H_2SO_4, Δ
2. Br_2

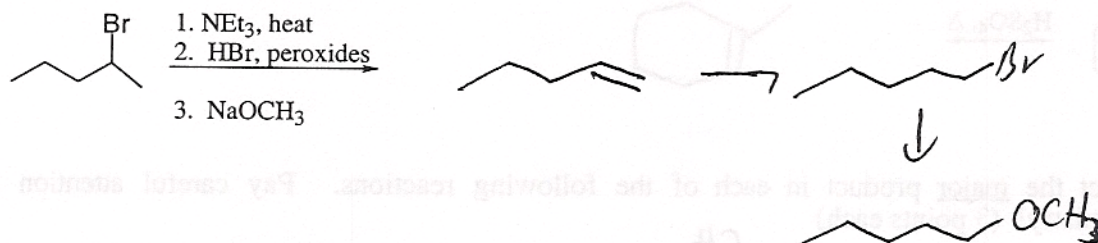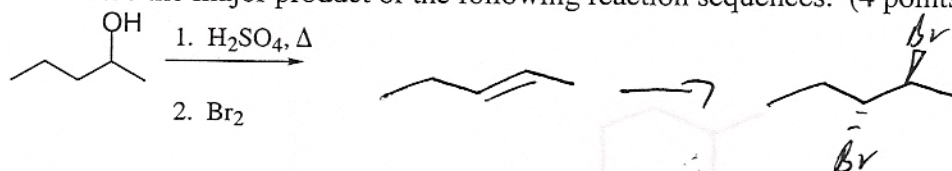[three drawn structures: alkene, an arrow mark, and branched structure with Br]

[structure with Br]
1. NEt_3, heat
2. HBr, peroxides
3. $NaOCH_3$

[drawn structures: alkene, arrow mark, chain with Br, down arrow, chain with OCH_3]

9. What is a possible structure for a molecule A given the following: (6 points)
a. is has the formula C_6H_{10}
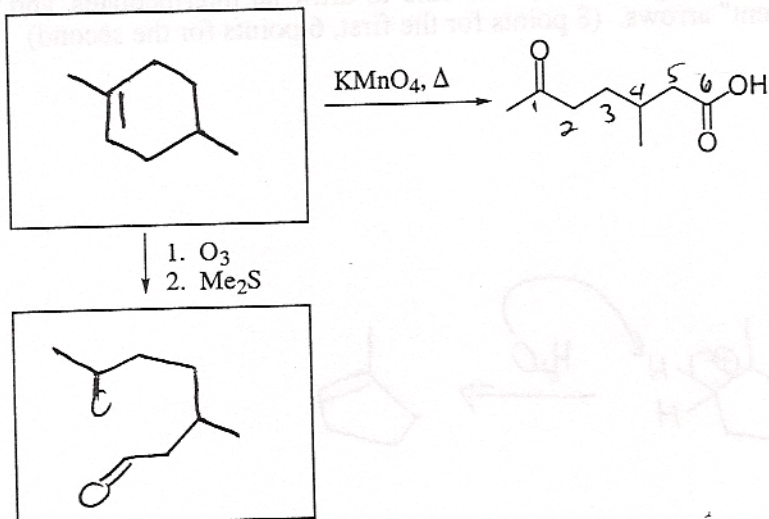b. it reacts with H_2/Pt to give a product with formula C_6H_{12}
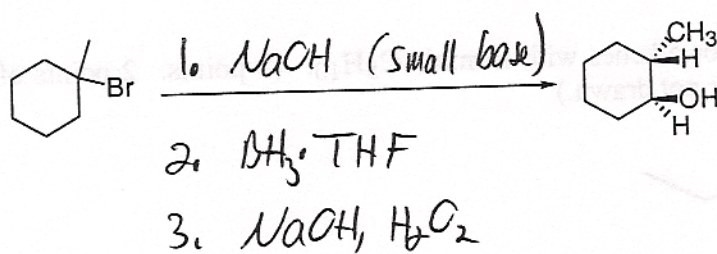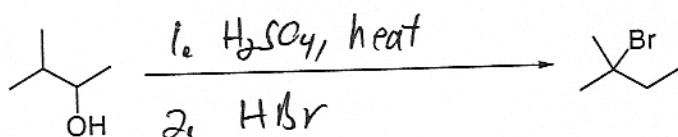c. upon ozonolysis (O_3; Me_2S) it gives two products, $CH_2=O$ and a product C_5H_8O.

$EU=2$
~~two~~ just one alkene

[structure: cyclopentane ring with =CH$_2$]

3
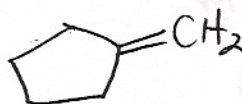
10. Fill in the boxes. (6 points total)

KMnO₄, Δ → [structure with numbered carbons 1, 2, 3, 4, 5, 6 OH]

1. O₃
2. Me₂S

11. Provide reagents to accomplish the following transformations. (6 points each)

[structure with OH] 1. H₂SO₄, heat   →   [structure with Br]
                     2. HBr

[cyclohexane with Br] 1. NaOH (small base)   →   [cyclohexane with CH₃, H, OH, H]
                       2. BH₃·THF
                       3. NaOH, H₂O₂

4

12. Draw the mechanisms for the following reactions. Be sure to draw all intermediates, and try to correctly draw "electron-movement" arrows. (8 points for the first, 6 points for the second)
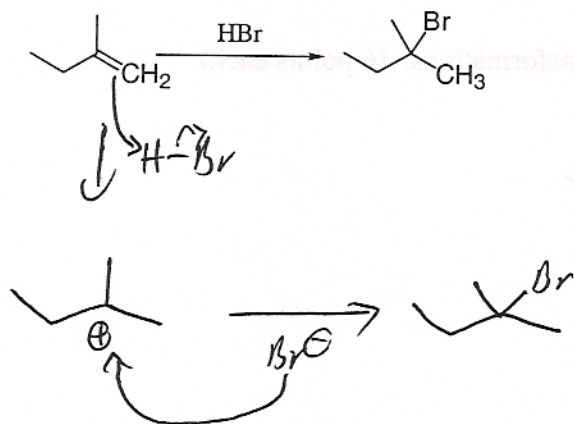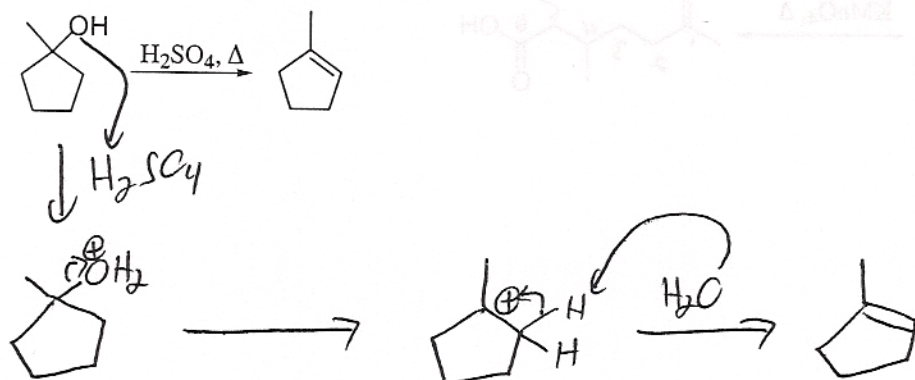
13. Draw as many isomers as you can for alkenes with formula C_5H_{10}. (8 points. 2 points off for each duplicate or each possible isomer not drawn.)