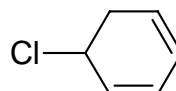
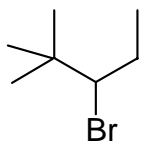


Name \_\_\_\_\_

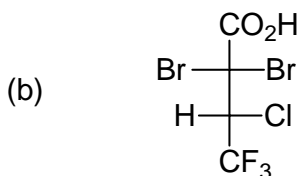
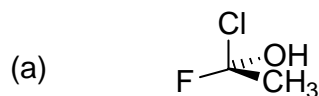
If you do not want your graded exam placed in the box outside my office, then please tick here \_\_\_\_\_

Answer all the questions.

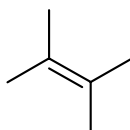
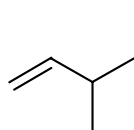
- 1) (6pts) Draw the corresponding cations that these two molecules would form upon ionization.



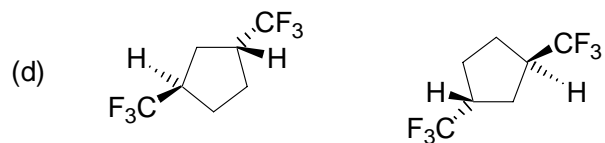
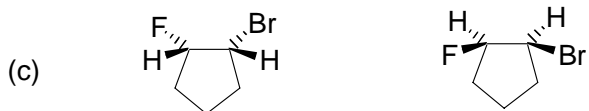
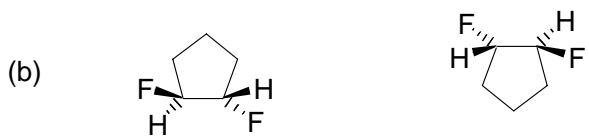
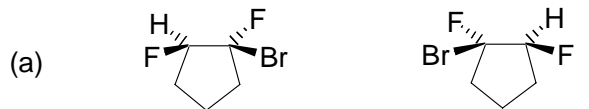
- 2) (4pts) Assign (R) or (S) to **all** the chiral centers in the following molecules.



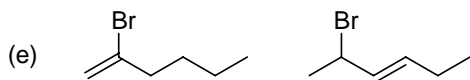
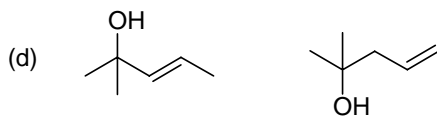
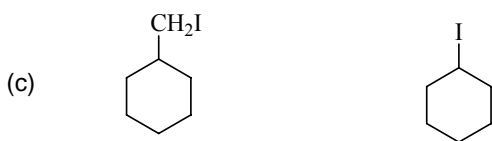
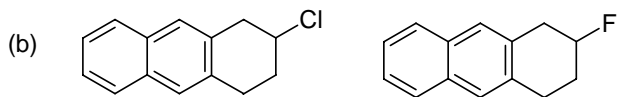
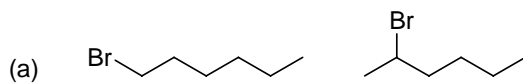
- 3) (12pts) Name these compounds in IUPAC form.



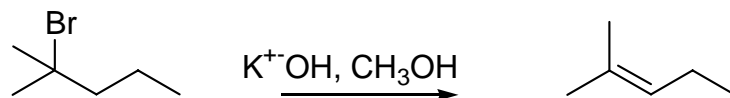
4) (12pts) Identify these pairs of compounds as either *same*, or *enantiomers*.



5) (10pts) For each pair of molecules, circle the one which will undergo  $S_N1$  type reactions the quickest.



6) (8pts) Write a mechanism (i.e. curly arrows) for this **E1** elimination.



7) (10pts) Draw and label an Energy Level Diagram for a typical **S<sub>N</sub>2** process.

8) (10pts) Match (*i.e. draw a line from*) the reagent to the most accurate description of its transformation to an alkene  $\pi$  bond.

Reagents

**H-Br**

**conc. H<sub>2</sub>SO<sub>4</sub>, followed by  
boiling with H<sub>2</sub>O**

**Br<sub>2</sub>**

**OsO<sub>4</sub>, H<sub>2</sub>O<sub>2</sub>**

**BH<sub>3</sub>.THF, followed by  
NaOH, H<sub>2</sub>O<sub>2</sub>**

Transformation

Anti-Markovnikov and *Syn*  
addition of H-OH

Cartman Epoxidation

Markovnikov addition of H-Br.

Anti-Markovnikov and *Anti*  
addition of H-OH

*Syn* addition of Br-Br

*Syn* addition of Cl-Br

*Syn* addition of H-I

Anti-Markovnikov addition of  
H-Cl

Markovnikov addition of H-OH

Anti-Markovnikov addition of  
H-Br

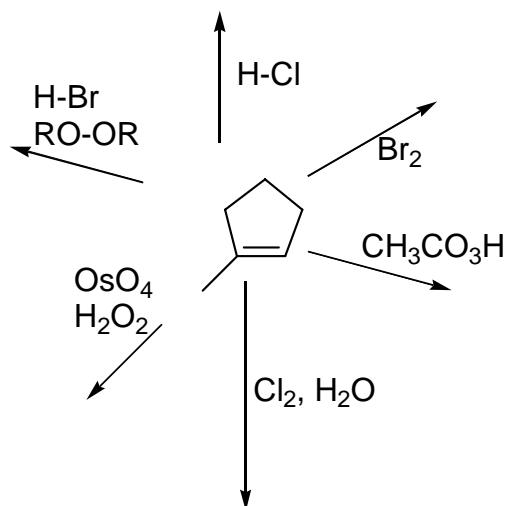
*Anti* addition of Br-Br

*Syn* hydroxylation

*Anti* hydroxylation

Oxidative cleavage

9) (18pts) Give the products formed in the following transformations of the below cyclic alkene, paying attention to stereo- and regio-chemistry where relevant.



**FOR TWO BONUS POINTS:** What class of compound is the product from the peroxyacid/alkene reaction?

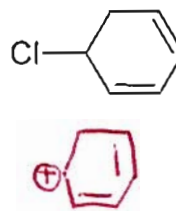
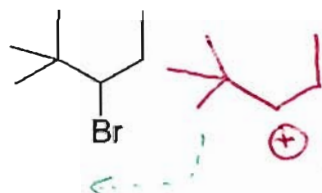
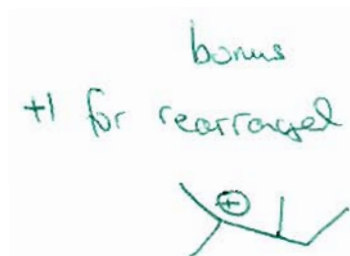
10) (10pts) Write the mechanism for **one** of the ANTI additions reactions above.

Name DIANE FORAB-EAR

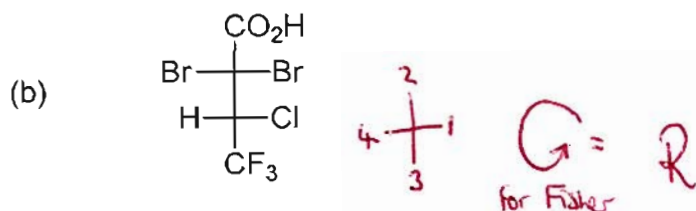
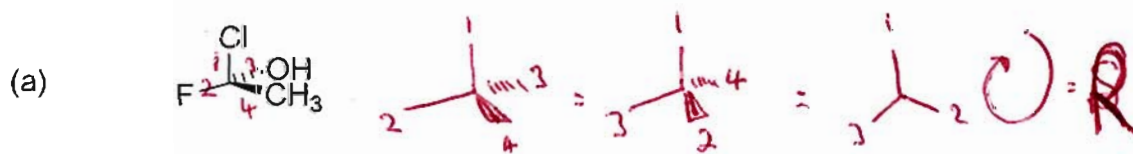
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Answer all the questions.

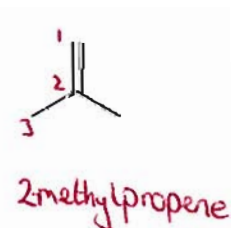
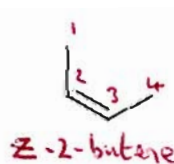
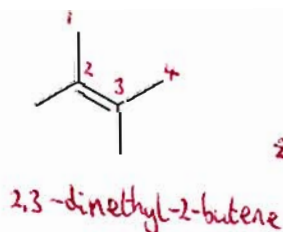
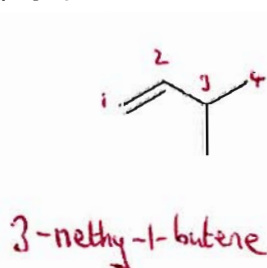
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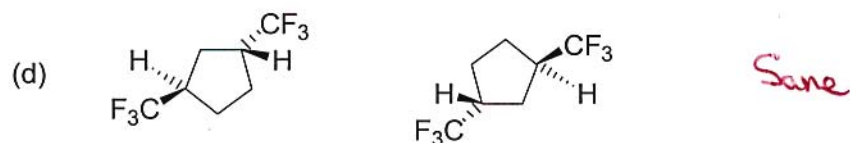
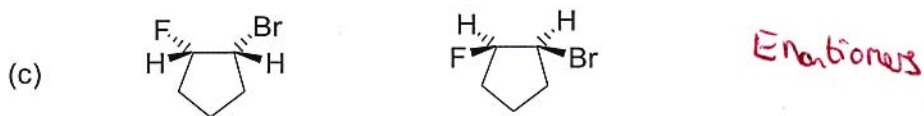
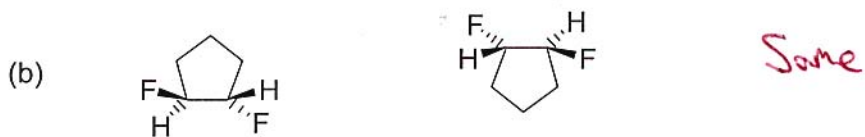
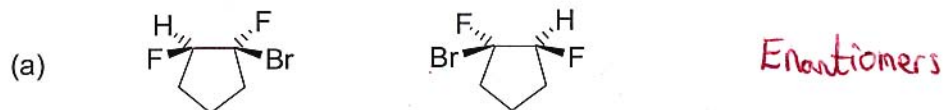
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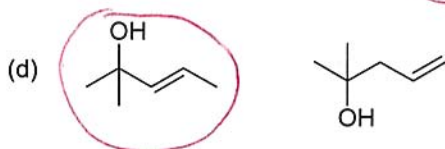
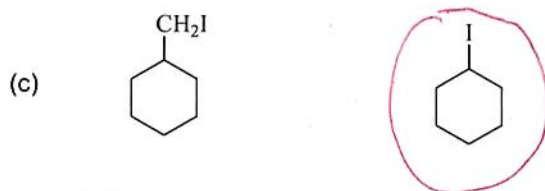
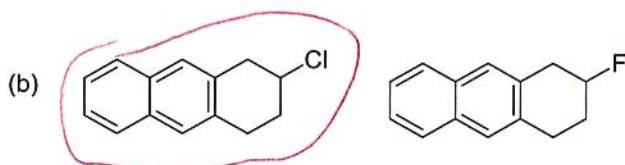
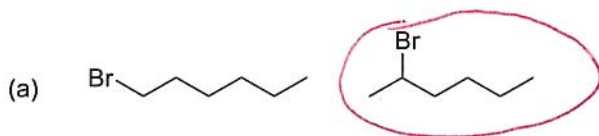
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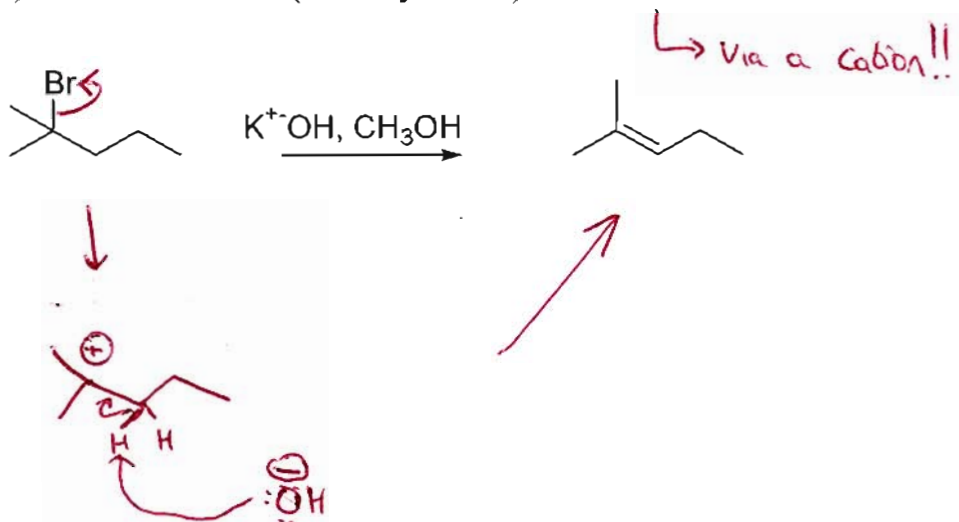
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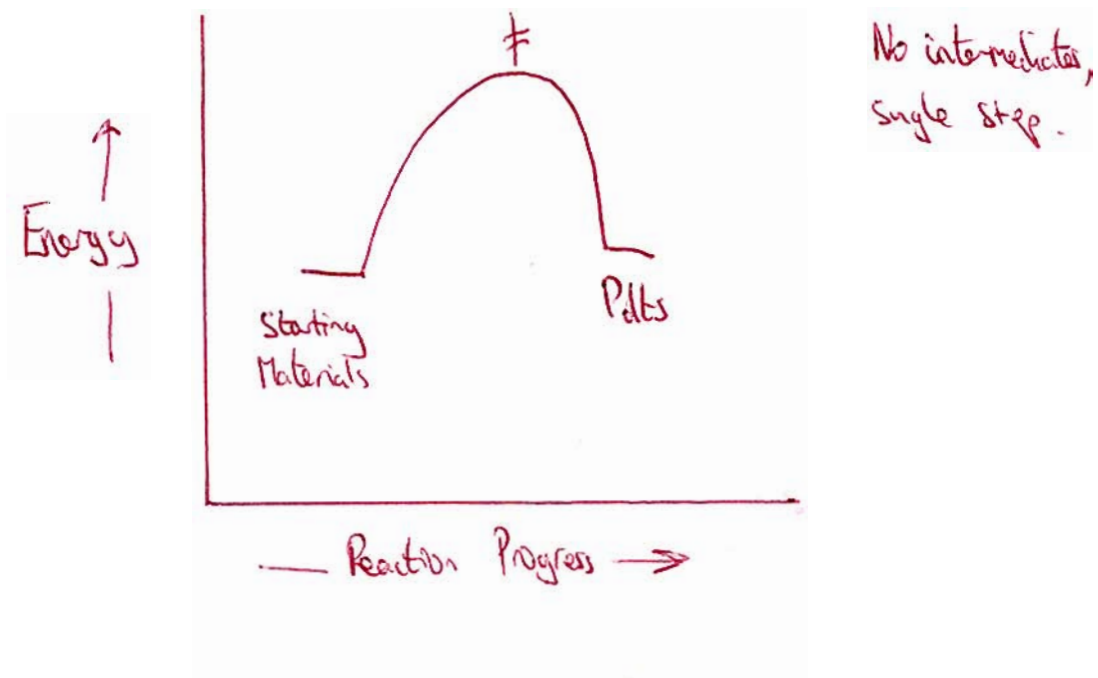
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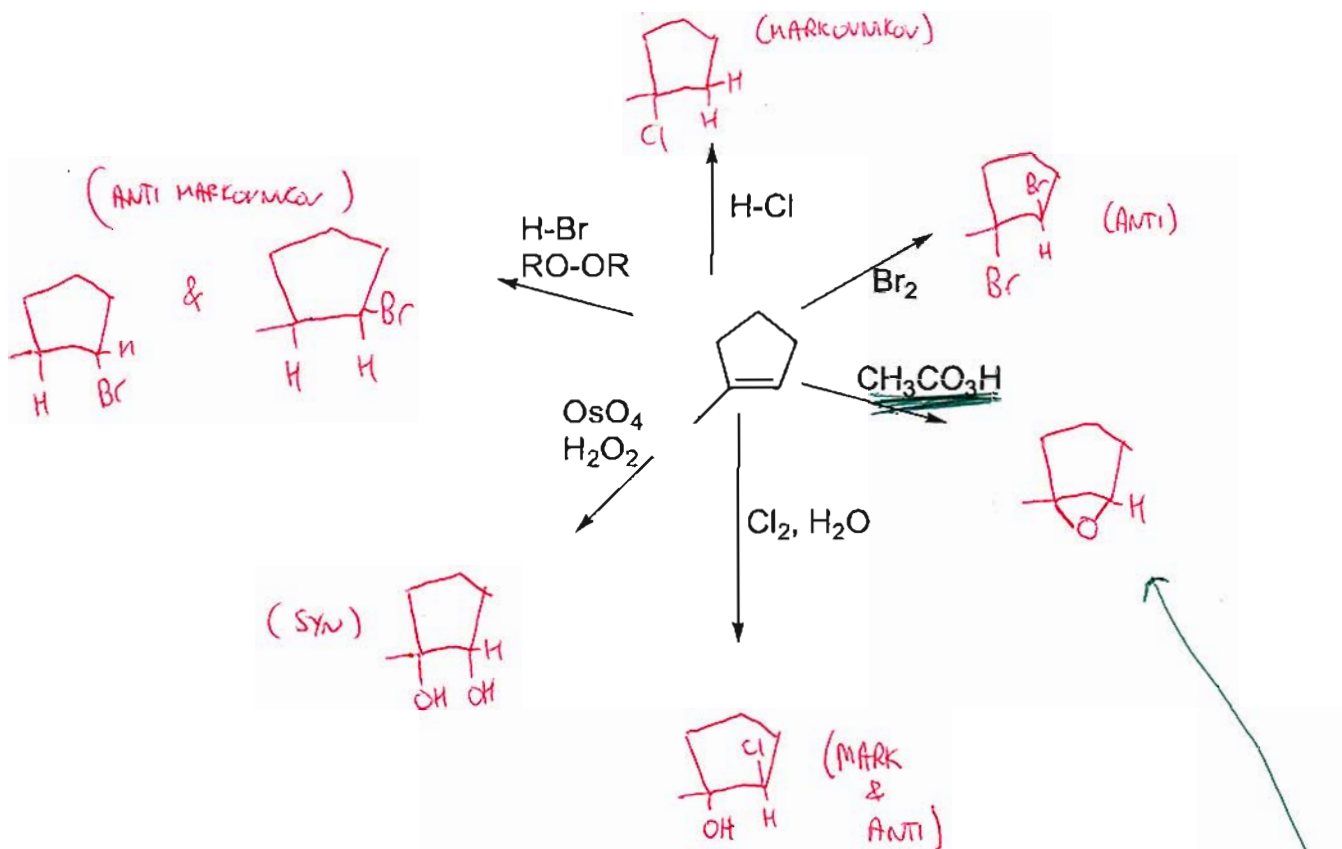
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8) (10pts) Match (*i.e. draw a line from*) the reagent to the most accurate description of its transformation to an alkene  $\pi$  bond.

<u>Reagents</u>	<u>Transformation</u>
H-Br	Anti-Markovnikov and <i>Syn</i> addition of H-OH
	Cartman Epoxidation
	Markovnikov addition of H-Br.
conc. H <sub>2</sub> SO <sub>4</sub> , followed by boiling with H <sub>2</sub> O	Anti-Markovnikov and <i>Anti</i> addition of H-OH
	<i>Syn</i> addition of Br-Br
	<i>Syn</i> addition of Cl-Br
	<i>Syn</i> addition of H-I
Br <sub>2</sub>	Anti-Markovnikov addition of H-Cl
	Markovnikov addition of H-OH
OsO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub>	Anti-Markovnikov addition of H-Br
	<i>Anti</i> addition of Br-Br
	<i>Syn</i> hydroxylation
BH <sub>3</sub> .THF, followed by NaOH, H <sub>2</sub> O <sub>2</sub>	<i>Anti</i> hydroxylation
	Oxidative cleavage

9) (18pts) Give the products formed in the following transformations of the below cyclic alkene, paying attention to stereo- and regio-chemistry where relevant.



**FOR TWO BONUS POINTS:** What class of compound is the product from the peroxyacid/alkene reaction?

EPOXIDE

10) (10pts) Write the mechanism for **one** of the ANTI additions reactions above. ( $\text{Br}_2$  or  $\text{Cl}_2/\text{H}_2\text{O}$ )

