Name:_____ Section (A or B):_____

Exam 3
Organic Chemistry
Chem 141
Fall 2007

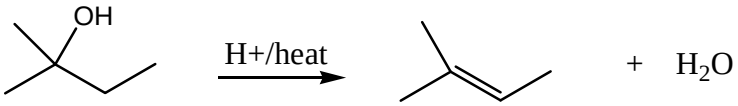
Problems	Pages	Points	Grader
	____	____	____
	____	____	____
	____	____	____
	____	____	____
	____	____	____

TOTAL _____points

% _____

1. What is an elimination reaction (decribed in a few brief sentences)? Show a specific example (4 points)

An elimination reaction generates two molecules from one. An example is the dehydration of an alcohol to form an alkene. 2 pts



+ H_2O

2pts for equation

2. What is the order of stability for carbocations depending on the degree of substitution? (1 point)

Tertiary> secondary> primary>methyl

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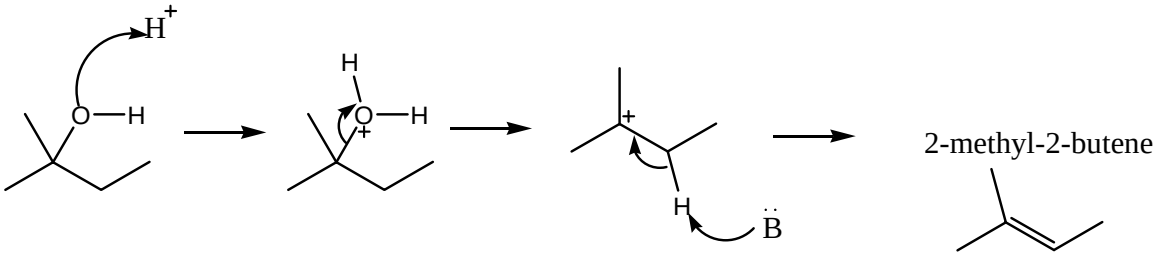
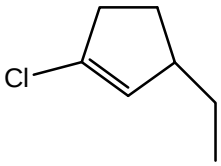
3. Add curved-arrows to show how the following intermediates are mechanistically related and give the structure of the product (1 point per correct arrow, 1 point for product) 5 points total



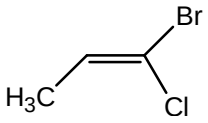
4. Name the following structures (2 points each)

a)



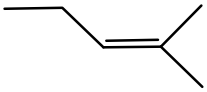
1-chloro-3-ethyl-cyclopentene

b)



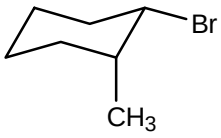
(1*E*)-1-bromo-1-chloropropene

c)



2-methyl-2-pentene

d)



cis-1-bromo-2-methyl-cyclohexane

5. Number the following substituent (1=highest priority, 4= lowest priority) according to the Cahn-Ingold-Prelog conventions for E/Z designations (4 points each) 1pt per correct

a) -F __2___, -CH_3__4___, -Br__1___ , -OH___3___

b) -C≡C-H _2____, -CH_2-CH_3 __3___ , -CH_3 __4___ , -OH __1___

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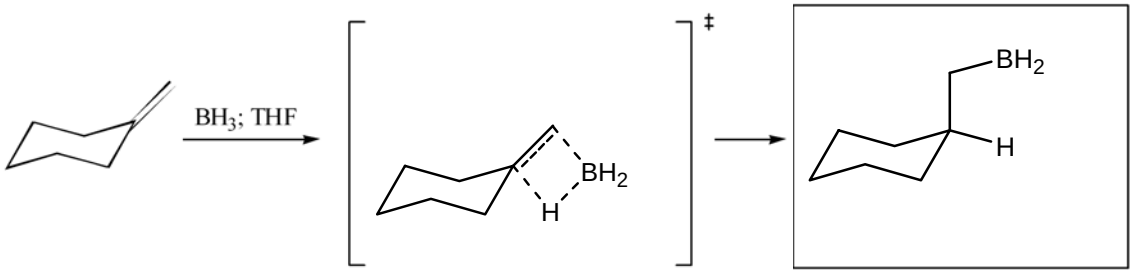
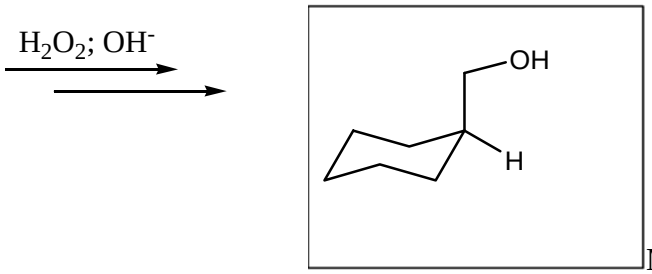
6. Draw the transition state, intermediate, and product for the following hydroboration and oxidation showing the regioselectivity of the reaction. Does the product show Markovnikov **or anti-Markovnikov** orientation? (10 points)



4 points 2 points

transition state intermediate



Must state **Anti-Markovnikov**

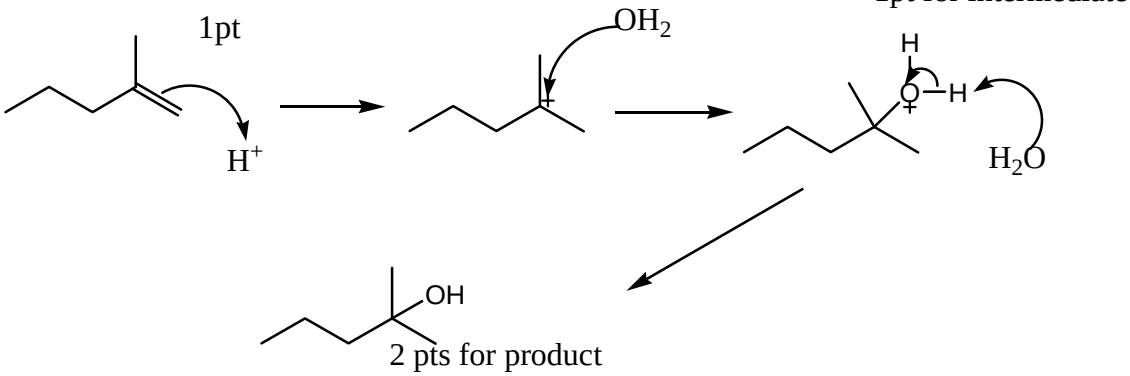
2 points 2 points

product

7. Show a full mechanism including intermediates for the following reaction (8 points)

1pt for arrow
1pt for 3' carbocation

2pt per arrows
1pt for intermediate



2 pts for product

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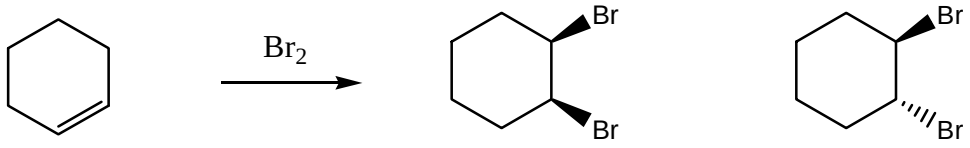
8. (a) What products do you predict from the following reaction if it goes through a carbocation intermediate? (4 points)



2 pts for each product

3pt for only one product

(b) What products do you predict if it goes through a bromonium ion intermediate (4 points)

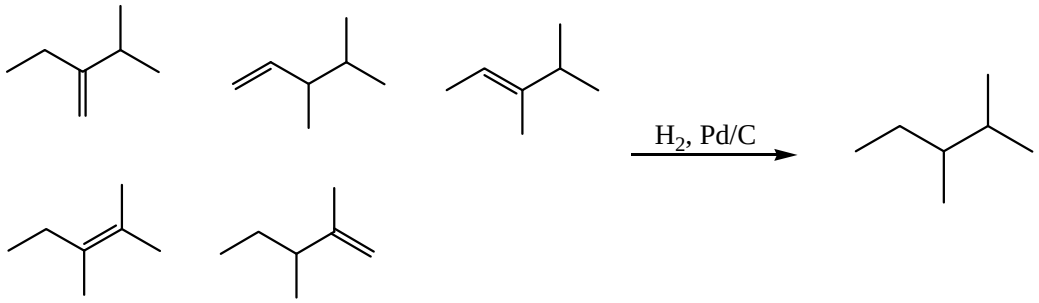
2 points for each product

Or at least show trans 3pts for only one product

(c) Which is the correct mechanism, (a) or (b)? (2 points)

B

9. What isomeric alkenes could be catalytically hydrogenated to the following alkane? (2 points per correct structure)



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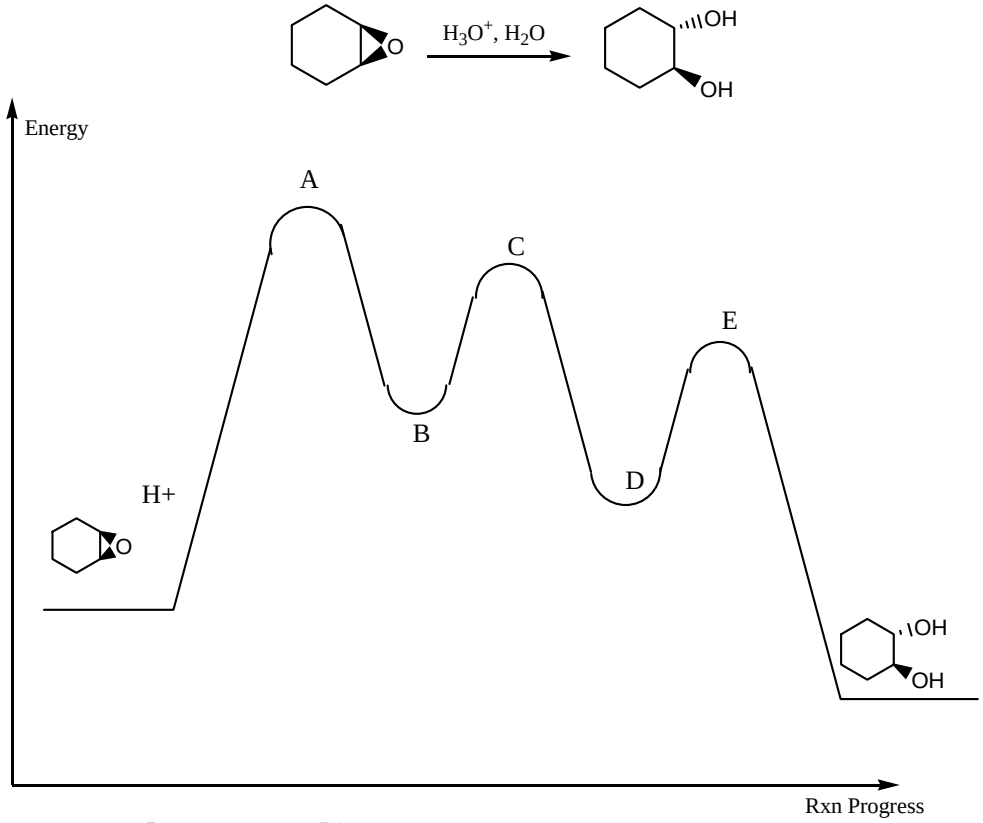
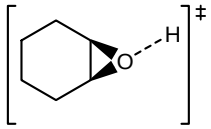
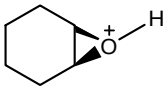
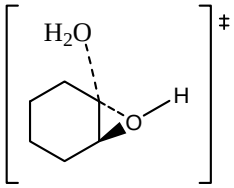
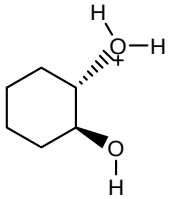
10. Draw a free energy diagram to describe the acid-catalyzed ring opening of the following epoxide. Draw structures of intermediates and transition states at the relevant positions (10 points)

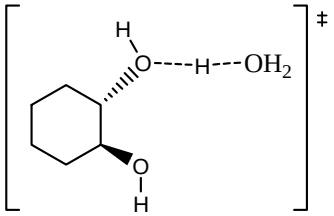


A 

B 

C 

D 

E 

2 pts for Transition State or intermediate

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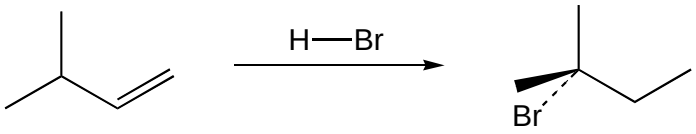
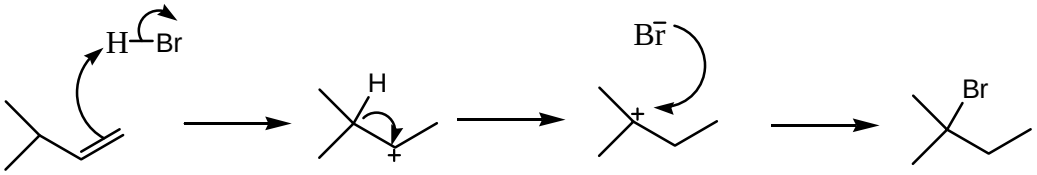
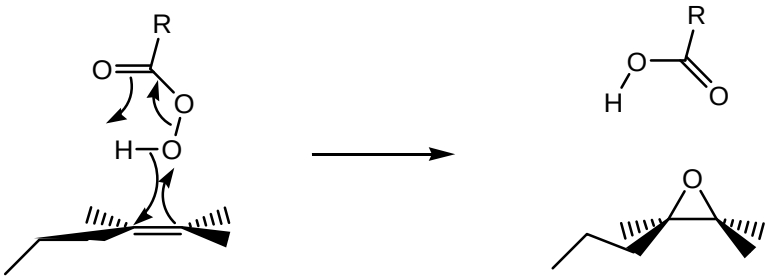
11. Provide a full mechanism for the following reaction (10 points)





3pts 4pts 3pts

12. Add arrows to best illustrate the motion of electrons for the following concerted mechanism (2 point per correct arrow)



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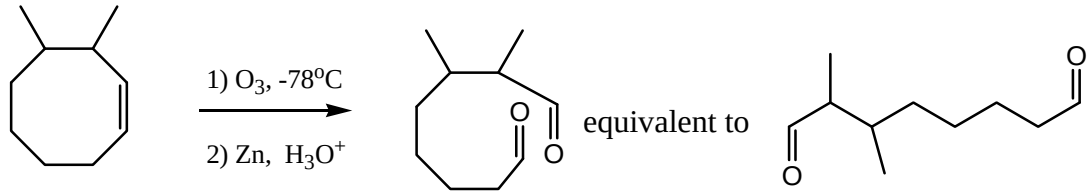
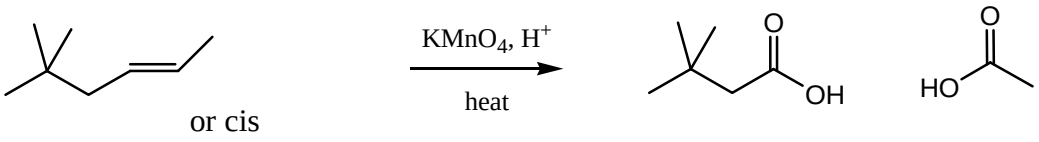
13. Provide the missing starting material, reagents, and products for the following reactions. Include dashes and wedges to define important stereochemistry where relevant (3 points each)

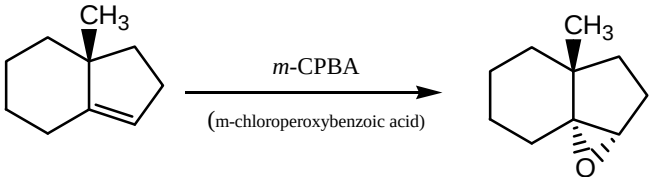
a)



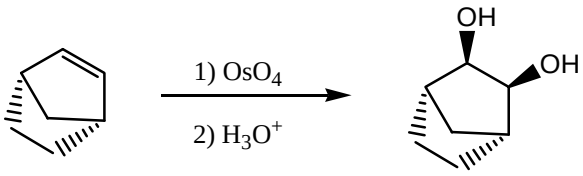
b)



c)



d)



14. If you could design a reaction with world altering consequences, what would the reaction do? (2 points)