CHEM 3311, Professor Zhang, Spring 2010
Second hour exam, Mar 11, 2010

Printed Name:_____ Student ID:_____

Scores:

1)

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This is a closed-book exam. The use of notes, models, calculators, scratch paper will not be allowed during the exam. Please put all your answers on the test. Use the backs of the pages for scratch.

Partial Periodic Table

1A	2A	3A	4A	5A	6A	7A	8A
1 H							2 He
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
						35 Br	
						53 I	

1. (15 pts) Describe the relationship between each of the following pairs of structures using one of the following descriptions: constitutional isomers; homomers (same molecules); conformers (conformational isomers); enantiomers, or diastereomers.

a. 

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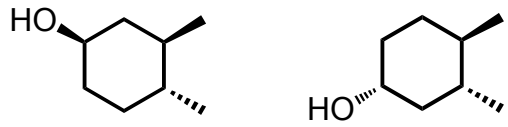
b. 

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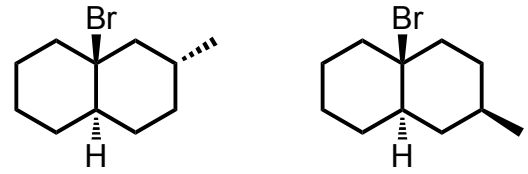
c. 

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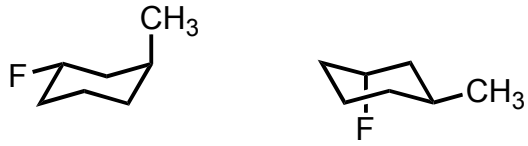
d. 

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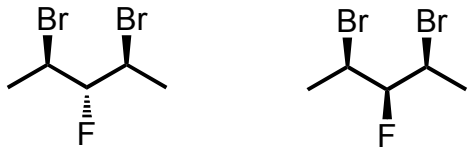
e. 

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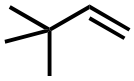
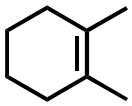
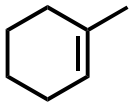
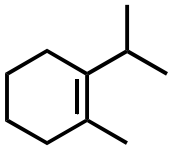
2. (20 pts) Draw the single major product of each of the following reactions, showing stereochemistry using wedges and dashes. If a racemate is formed, show only one enantiomer of the product, and label it "rac".

a.  1. $Hg(OAc)_2$, H_2O → 2. $NaBH_4$

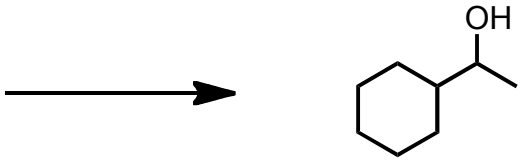
b.  Br_2, CH_2Cl_2 →

c.  Br_2, CH_2Cl_2 →

d.  1. O_3 → 2. HOOH

e.  1. BH_3 → 2. H_2O_2, NaOH

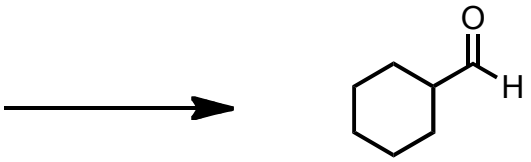
3. (25pts) Propose starting alkenes and reagents for accomplishing each of the following reactions. All chiral products are racemic mixtures.

a. 

b. 

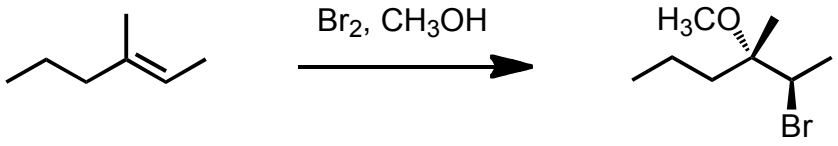
c. 

d. 

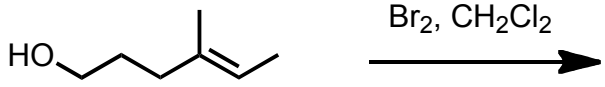
e. 

The only aldehyde product obtained

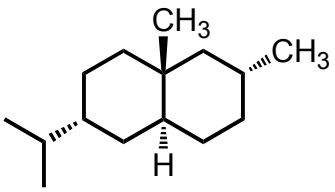
4. (15pts) a) Propose an arrow-pushing mechanism, showing all reactive intermediates (no transition states), for the following reaction. Indicate the stereochemistry of your intermediates using wedges and dashes. (9pts)



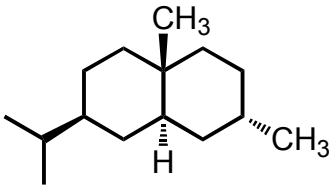
b) When the following alkene is treated with Br_2 in an unreactive solvent (e.g. CH_2Cl_2), the product(s) formed has(have) a molecular formula $C_7H_{13}BrO$. Give the structures of two possible products, indicate whether they are constitutional isomers, diastereomers or enantiomers. Carefully show stereochemistry using wedges and dashes. (6pts)



5. (12pts) Draw perspective chair structures for each of the decalin isomers given below, and circle the more stable isomer. Also indicate whether they are constitutional isomers, diastereomers or enantiomers.



A Chair structure for compound A



B Chair structure for compound B

6. (13pts) Assign the stereochemistry (R or S) to each asymmetric carbon in the following two structures. Also indicate whether they are constitutional isomers, diastereomers or enantiomers.