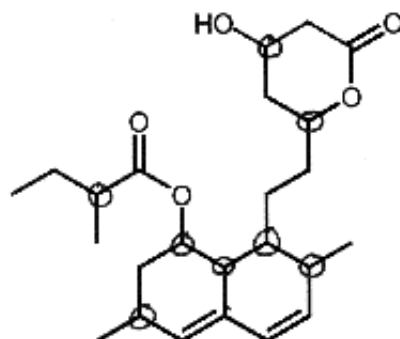


Question 1 (14 points)

Name key

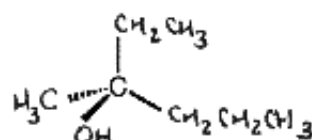
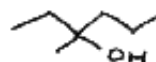
- a. (10 pts) Mevacor, shown below, is used clinically to lower cholesterol levels. Circle all the stereogenic centers in Mevacor.



Number of possible stereoisomers of Mevacor

2⁸

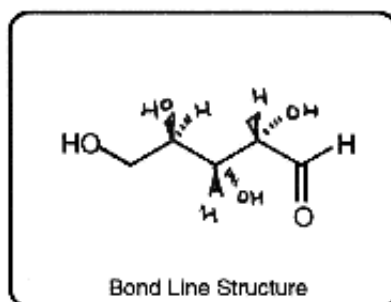
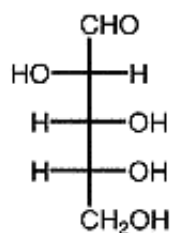
- b. (4 pts) Draw a 3-D picture of (S)-3-methyl-3-hexanol on the partial structure below. The TA's will sell you the structure of 3-methyl-3-hexanol for 1 point, if you need it.



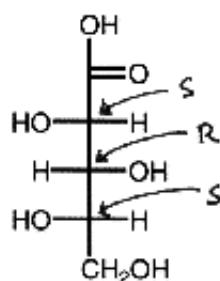
Question 2 (9 points)

Name Key

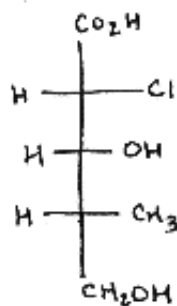
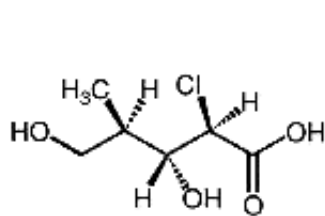
- a. (3 pts) Complete the bond-line (carbon skeleton) drawing for the Fischer projection below.



- b. (3 pts) Assign an **R** or **S** configuration to each stereogenic center in the following molecule.



- c. (3 pts) Draw a Fischer projection of the following molecule.

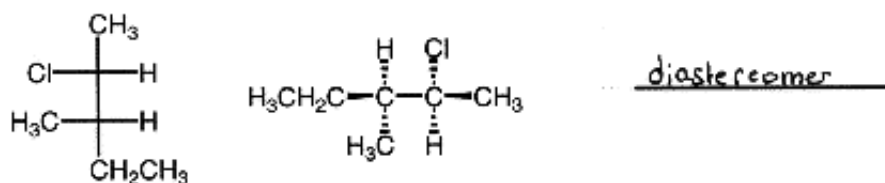


Question 3 (12 points)

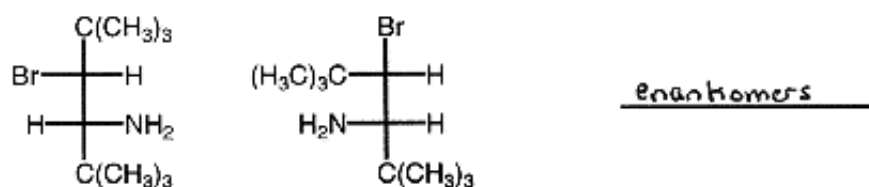
Name key

Label the following pairs of structures as one of the following: **identical**, **structural (or constitutional)** isomers, **enantiomers**, or **diastereomers**.

a. (3 pts)



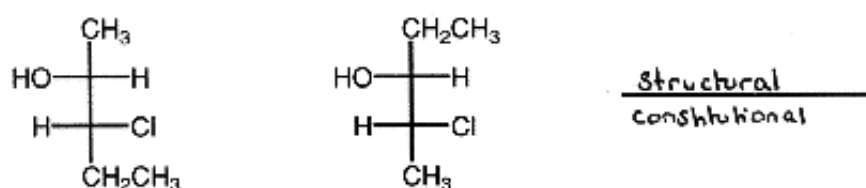
b. (3 pts)



c. (3 pts)



d. (3 pts)

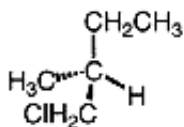
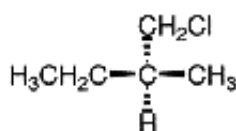


Question 4 (12 points)

Name key

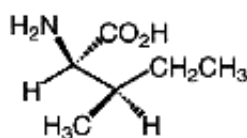
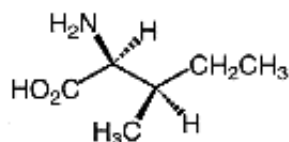
Label the following pairs of structures as one of the following: **identical**, **structural** (or **constitutional**) **isomers**, **enantiomers**, or **diastereomers**.

a. (3 pts)



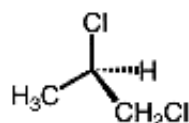
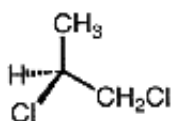
identical

b. (3 pts)



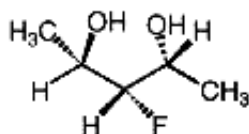
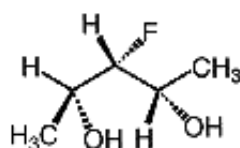
diastereomers

c. (3 pts)



enantiomers

d. (3 pts)



diastereomers

Question 5 (17 points)

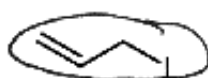
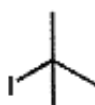
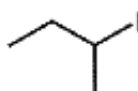
Name key

For each of the following sets of structures in parts a - d, choose the compound that best fits the description.

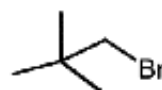
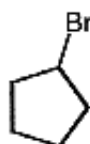
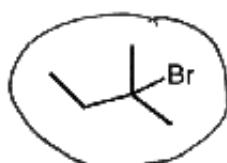
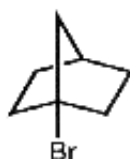
a. (3 pts) Is the best nucleophile:



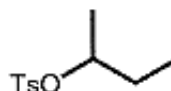
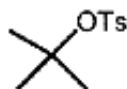
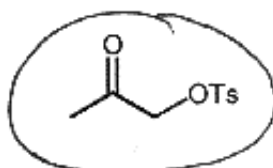
b. (3 pts) Reacts most rapidly in CH_3ONa in acetone:



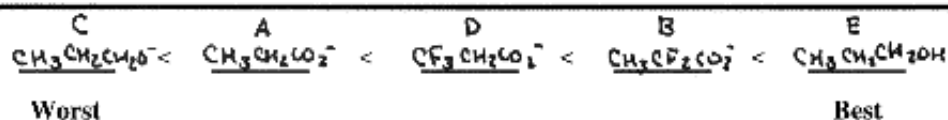
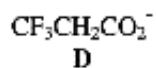
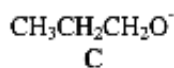
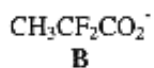
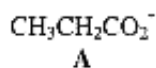
c. (3 pts) Reacts most rapidly in a solvolysis reaction in methanol:



d. (3 pts) Reacts most rapidly with NaI in DMSO solvent:



e. (5 pts) Arrange the following in order of **increasing** leaving group ability.

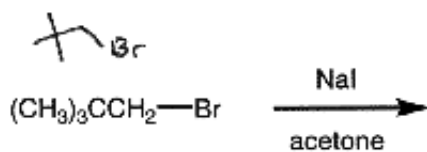


Question 6 (15 points)

Name key

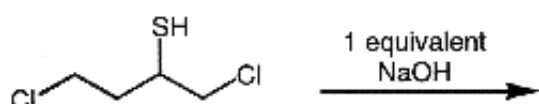
Give the complete structure of the major organic product(s) for the following reactions. Put your answer in the box provided. Be sure to indicate stereochemistry where appropriate. Write N.R., if no reaction occurs.

a. (3 pts)

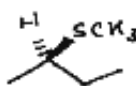
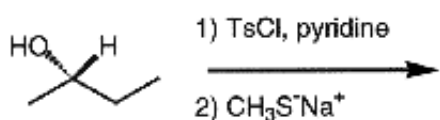


N.R.

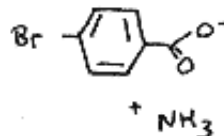
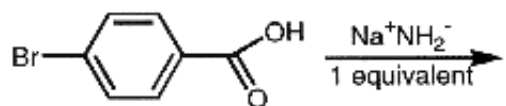
b. (3 pts)



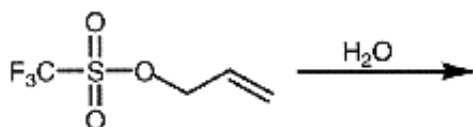
c. (3 pts)



d. (3 pts)



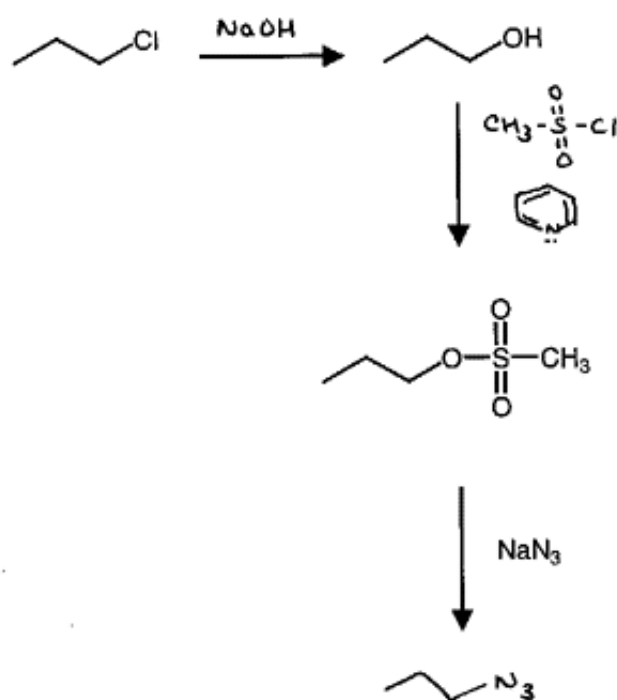
e. (3 pts)



Question 7 (9 points)

Name key

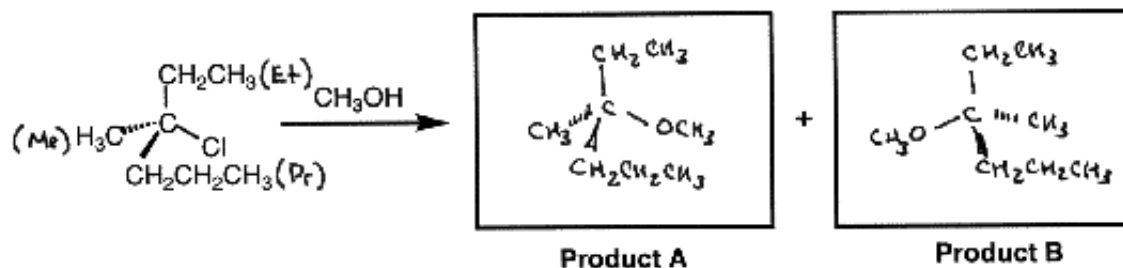
Provide the missing reagents and products for the following transformation. The reagents should be listed in order of use if more than one synthetic step is necessary.



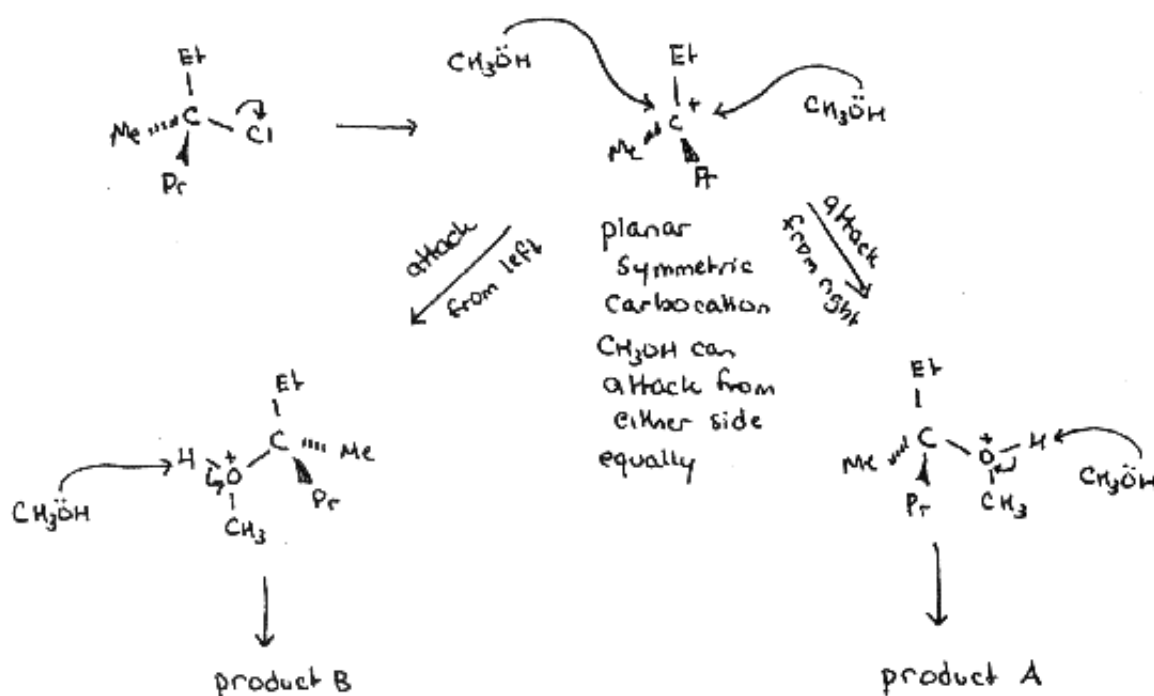
Question 8 (12 points)

Name key

Using the correct curved arrow formalism, draw the best mechanism for the following substitution reaction. Explain why a racemic mixture of products is formed. Be sure to show the stereochemistry of the products in the boxes provided.

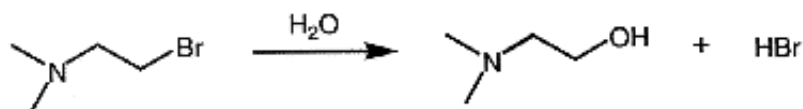


Is it possible to separate **product A** from **product B** by distillation? NO

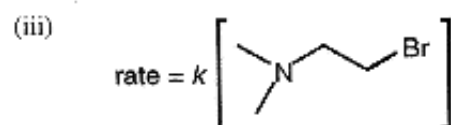
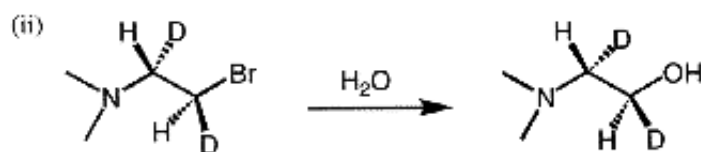
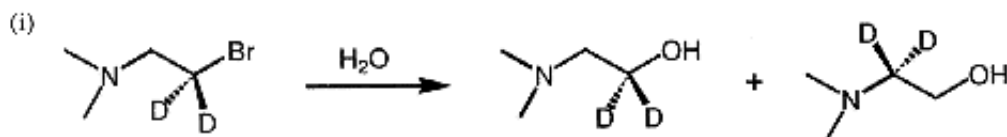


ONLY ONE OF THE EXTRA CREDIT PROBLEMS (a or b) WILL BE GRADED.

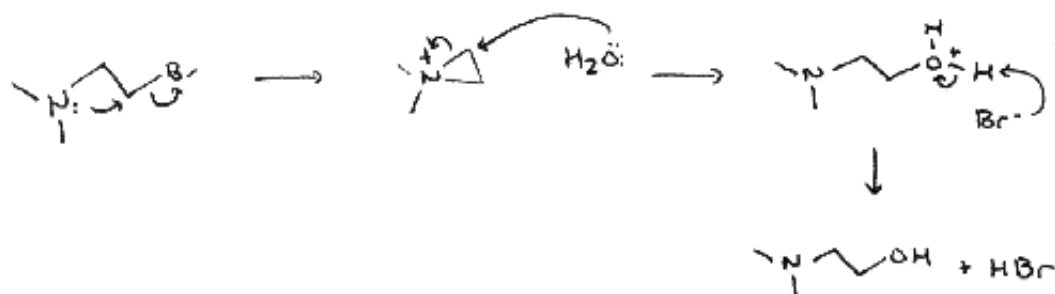
a. Propose a mechanism for the following reaction that is consistent with the data given.



DATA



ONLY ONE OF THE EXTRA CREDIT PROBLEMS (a or b) WILL BE GRADED.



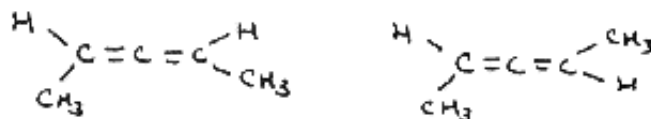
Extra Credit (10 points)

Name key

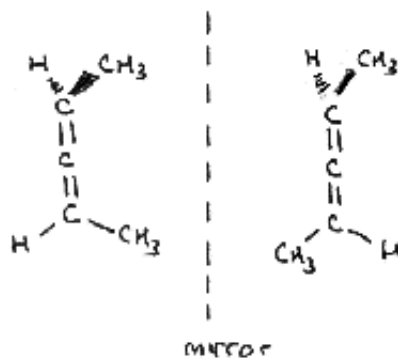
ONLY ONE OF THE EXTRA CREDIT PROBLEMS (a or b) WILL BE GRADED.

b. The 1,3-dimethylallenes ($\text{CH}_3\text{CH}=\text{C}=\text{CHCH}_3$) exist as isomers.

(i) Draw all the possible isomers.



(ii) Classify the isomers as structural (or constitutional) isomers, enantiomers, or diastereomers.



ONLY ONE OF THE EXTRA CREDIT PROBLEMS (a or b) WILL BE GRADED.