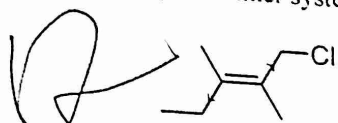
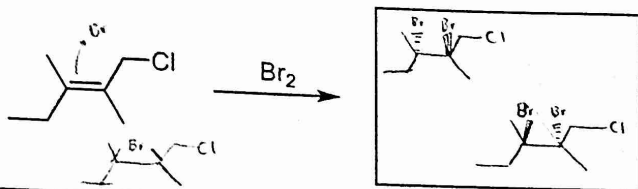


I. Nomenclature and More (12 pts) Using IUPAC nomenclature, name the following molecule. You may use either systematic names or common names for the substituents.



Name: (2E)-1-chloro-2,3-dimethylpentene

If this molecule were subjected to bromine gas, what product(s) would you expect to form?



Would the product be racemic?

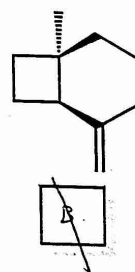
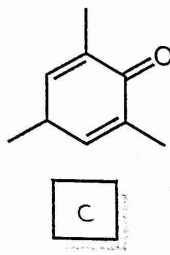
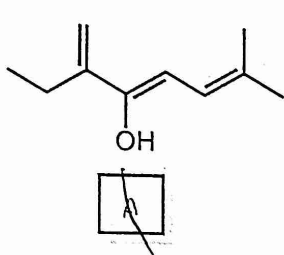
YES

NO

II. Terpenes & Co. (10 pts) In the corresponding boxes, label the following molecules as either:

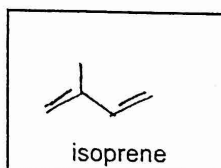
- A) Terpene
B) Terpenoid
C) Neither terpene nor terpenoid

4



How many different stereoisomers can the 1st molecule have (including itself)? ~~2³ = 8~~

Draw a molecule of isoprene (also known as 2-methyl-1,3-butadiene) below:



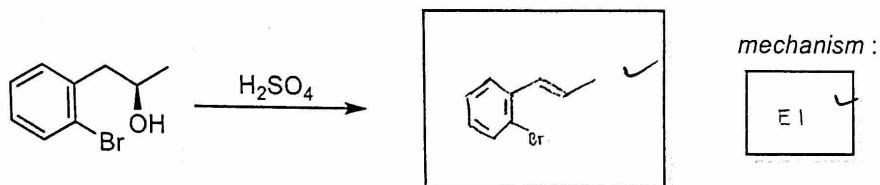
Last Name _____

III. Reactions (36 pts; 3 pts/answer) Complete the following reactions by filling in the missing reactants, reagents, products, and questions. Note any *specific instructions* for each reaction.

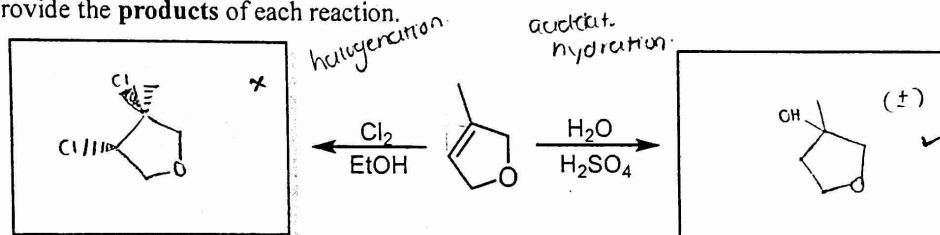
Notes on inputting answers in boxes:

- If the answer is a **single compound**, give its structure clearly.
- If the answer is a **racemic mixture**, you may give one enantiomer's structure clearly and write "racemic" or (\pm) under the answer.
- Reagent boxes may hold **multiple reagents**.

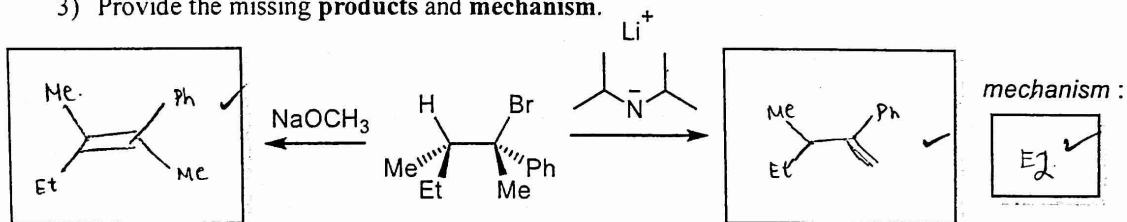
1) Provide the **product** and the **mechanism**.



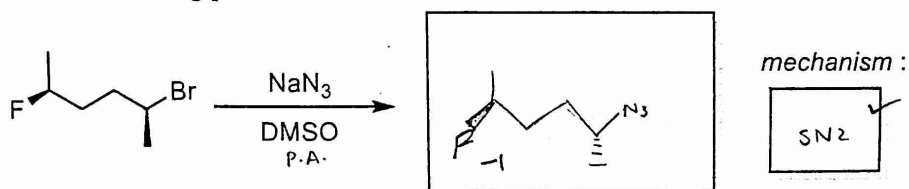
2) Provide the **products** of each reaction.



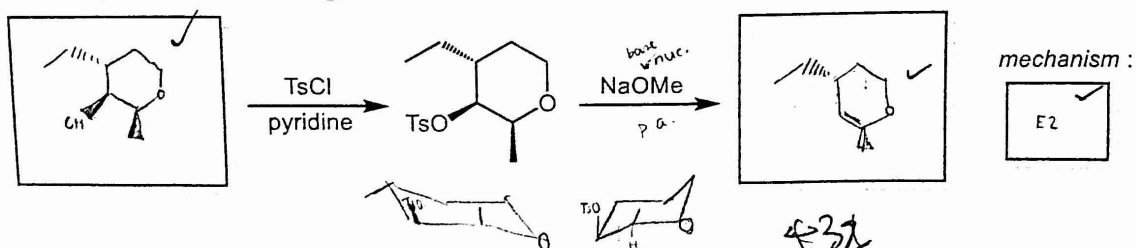
3) Provide the missing **products** and **mechanism**.



4) Provide the missing **product** and **mechanism**.

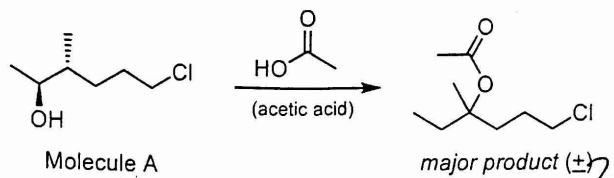


5) Provide the missing **molecules** and the **mechanism** of the 2nd step.



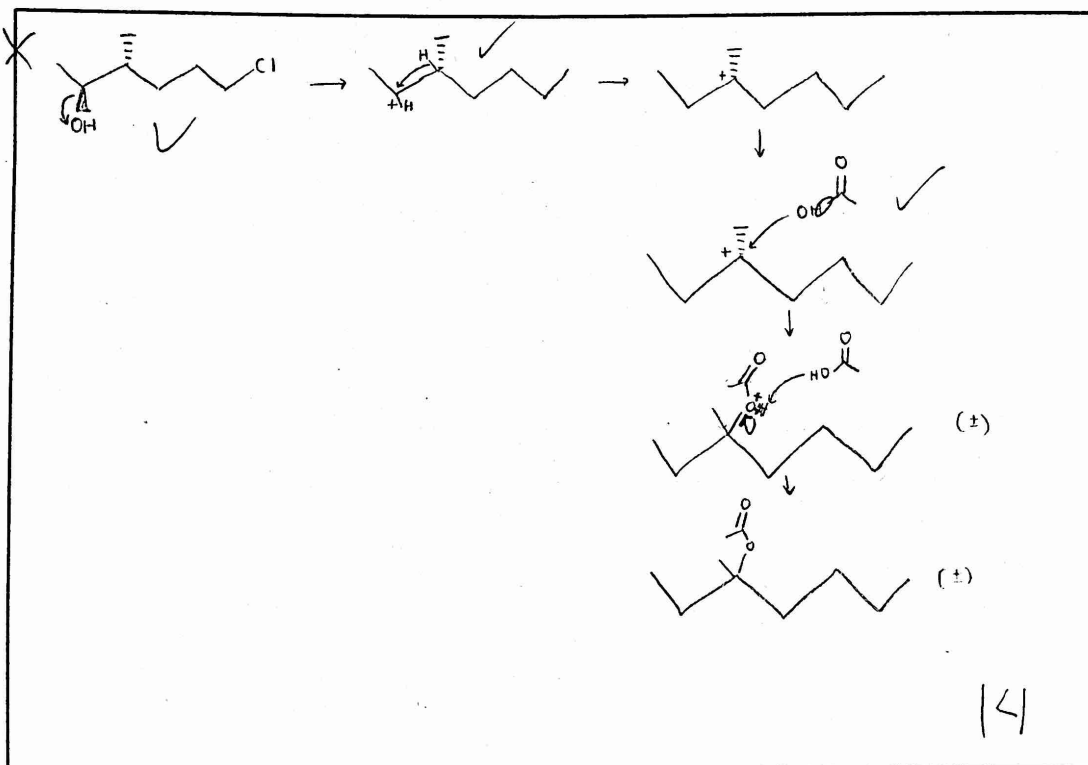
Last Name _____

IV. Mechanism (25 pts) Molecule A reacts with acetic acid to give the major product shown as a racemic mixture.

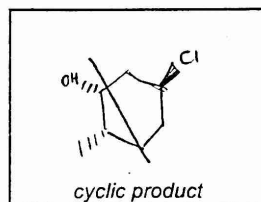


a) (2 pts) What **mechanism** is likely occurring here? Circle ONE: S_N1 S_N2 E1 E2

b) (20 pts) In the box below, draw the **complete mechanism** for the reaction above, using **curved arrows** to symbolize electron movement. Show each mechanistic step clearly and neatly, including **all intermediates and formal charges** when necessary. *Messiness may result in loss points.*



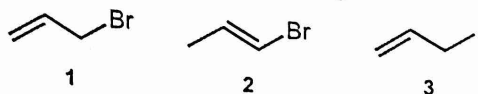
c) (3 pts) A 30BL student tried to perform the above reaction in lab, but accidentally used sodium hydroxide (NaOH), a **base**, instead of acetic acid, resulting in a **cyclic product**. As an experienced 30A student, **draw that product below**. *Hint: What is the most acidic proton, and after deprotonation, think S_N2 .*



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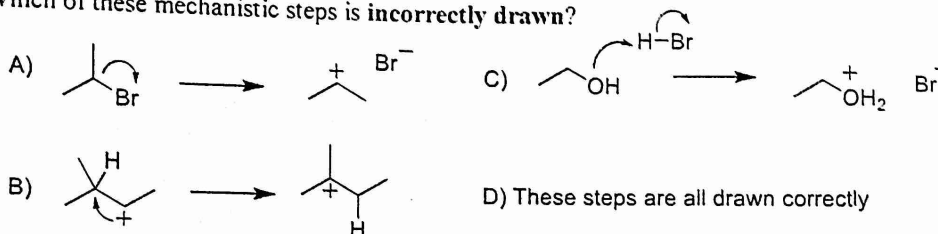
V. This, That, or the Other? (18 pts; 3 pts ea.) – Choose the *best* answer and write the letter of your answer in the box next to the question number. For True or False questions, write T for True and F for False.

1. Rank the following molecules in order of *increasing* E1 reactivity (*least reactive < most reactive*).



- A) 1 < 2 < 3 B) 2 < 1 < 3 C) 3 < 2 < 1 D) 2 < 3 < 1

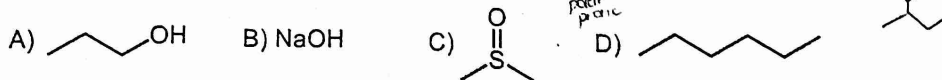
2. Which of these mechanistic steps is *incorrectly* drawn?



3. Which of the following is involved in the *rate-determining step* of an S_N1 reaction?

- A) nucleophilic attack C) carbocation formation
B) deprotonation D) double-bond formation

4. Of the following, which is the *best* solvent to induce an E1 elimination of 2-bromobutane?

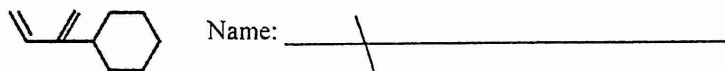


5. True or False: The “1” and “2” in S_N1/S_N2 refer to the *molecularity* of the mechanism (i.e. the *number of molecules* involved in the *rate-determining step*).

6. True or False: The terms “Markovnikov product” and “Zaitsev product” refer to *stereoselective* outcomes of reactions, while “syn-addition” and “antiperiplanarity” affect *regioselectivity*.

****BONUS:** Answer the next question for some extra credit points. These are *strictly extra points*, meaning that missing these will not be detrimental to your grade, and can only help you.

- B1) (3 pts) Give the IUPAC name of this molecule that you saw on the cover of your test.



- B2) (2 pts) On the list 15 terms you were shown during the Metacognition Fun Friday...

What was the 5th term? Hammett What was the 9th term? Footwall 700000