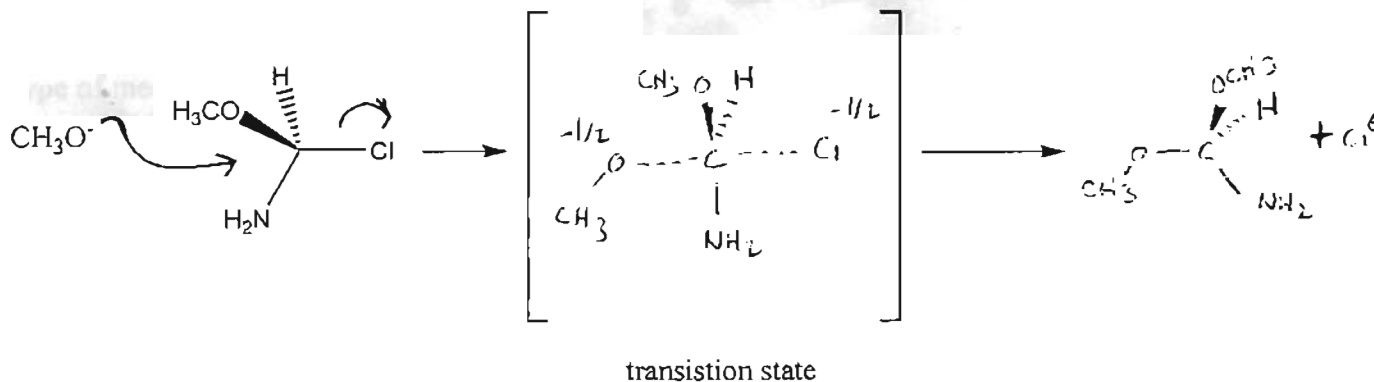


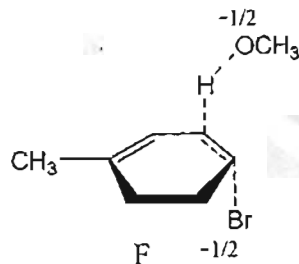
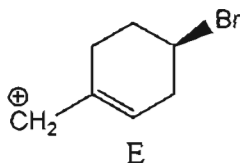
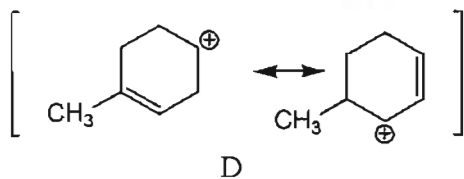
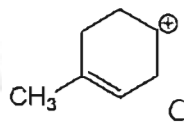
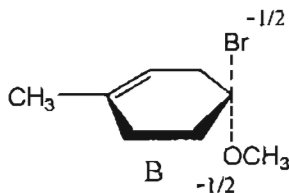
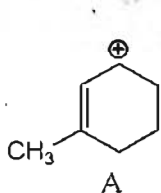
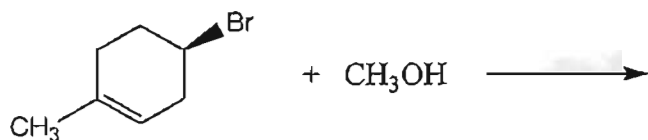
1. (10 pts) Draw the arrow pushing mechanism, for the following S_N2 reaction. Be sure to show pertinent stereochemistry for the transition state and final product.



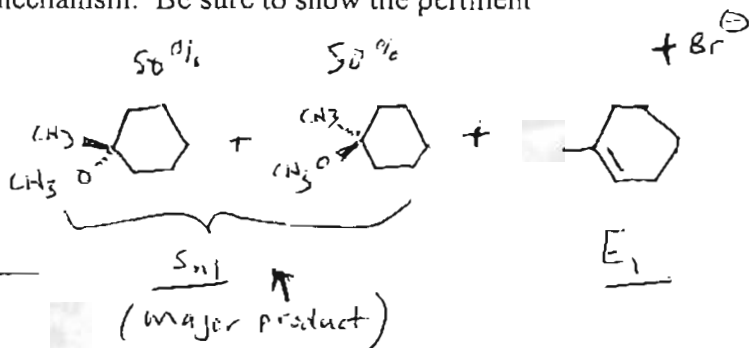
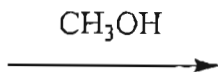
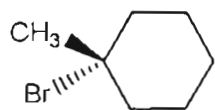
2. (8 pts) For the reaction below, identify which structure (A-F) would be the intermediate for:

The S_N1 mechanism: C +4 pts for 2A-F +1 for A

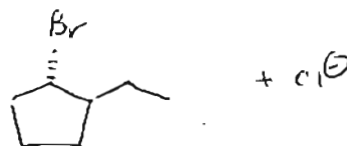
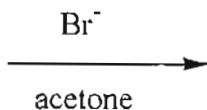
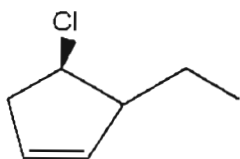
The $E1$ mechanism: C



3. (16 pts – 8 pts each) For the reactions below, state if the mechanism is S_N1 , S_N2 , $E2$ or $E1$ and draw the product(s) produced by this mechanism. Be sure to show the pertinent stereochemistry for the product(s).

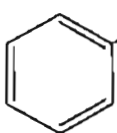


Type of mechanism: $S_N1 / E1$



Type of mechanism S_N2

4. (8 pts) Can either of the molecules below (A and B) undergo an $E1$ reaction mechanism? **If no**, briefly explain why it cannot. **If yes**, draw the product of the reaction.



CH_2OH

$E1$

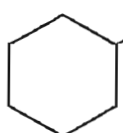


A Undergo $E1$? NO

There are no β protons to pull in the second step

\leftarrow stable cation but...

 \leftarrow NO β proton



CH_2OH

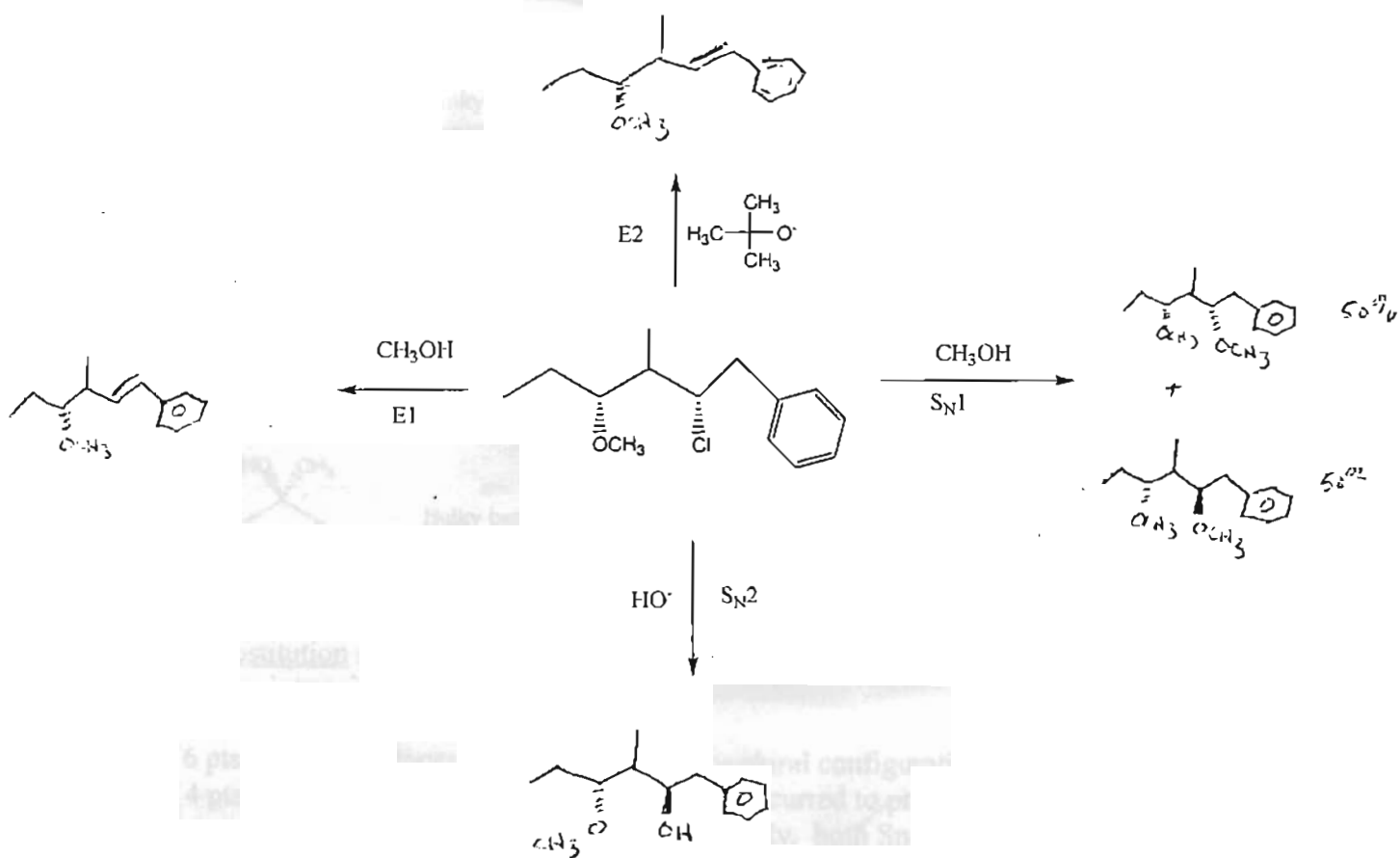
$E1$



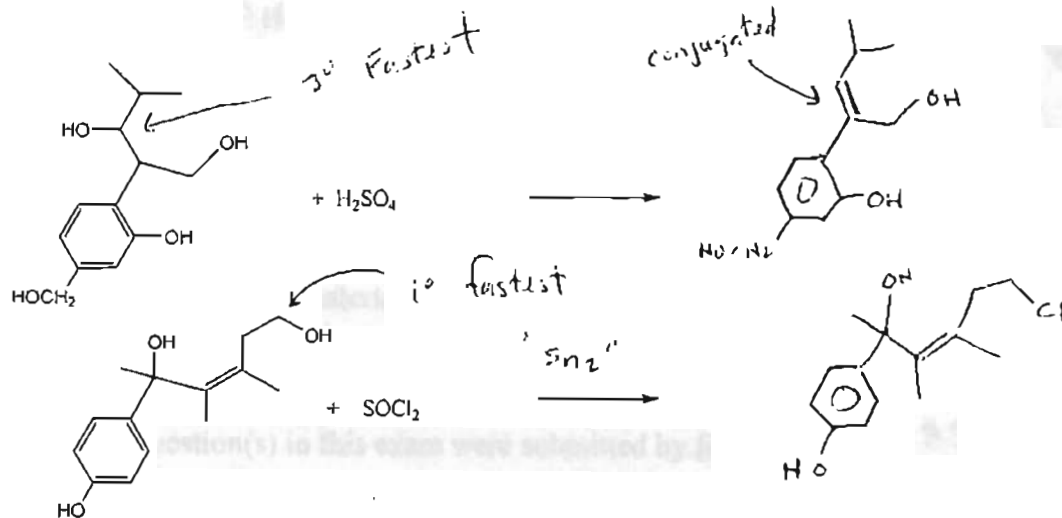
B Undergo $E1$? NO

\leftarrow 1 $^\circ$ cation - too unstable

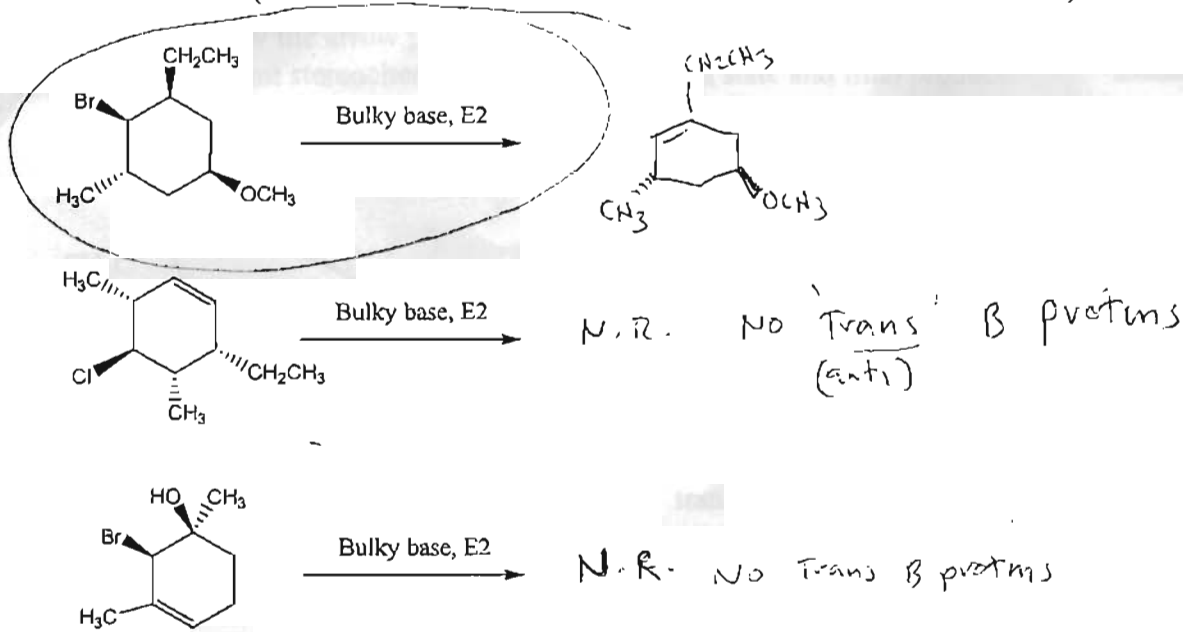
5. (24 pts-6 pts each) Draw the products for the following reactions (the mechanism is given for each reaction). Be sure to show the stereochemistry of the products.



6. (14 pts-7 pts each) Fill in the major product for the reactions below (do not worry about stereochemistry of the product).

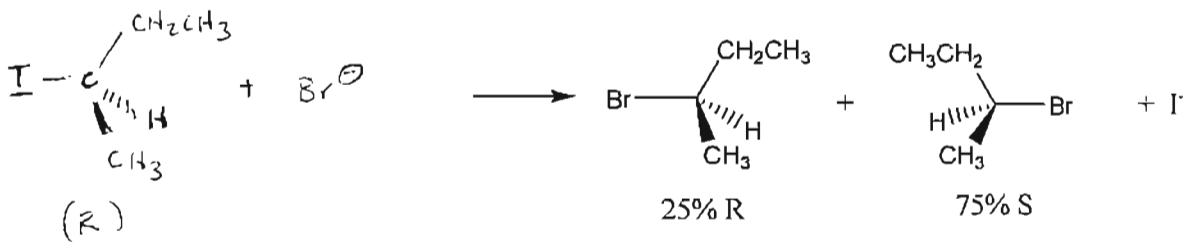


7. (10 pts) Some of the reactions shown below can react by the E2 mechanism and others cannot. Circle the reaction(s) that can go by the E2 mechanism and draw the product of those reactions (If an E2 mechanism cannot occur write 'NR' after the reaction).



8. A substitution reaction occurs and the two products shown below are produced. The product mixture is 25% R and 75% S.

- a. (6 pts) Draw the starting material showing its chiral configuration
 b. (4 pts) What kind of mechanism(s) must have occurred to produce this product mixture. Circle one of these possibilities: Sn2 only, Sn1 only, both Sn1 and Sn2.



Starting material

Extra credit (3 pts):

- a. Which question(s) in this exam were submitted by fellow students? #2, 4, 3
- b. What is your nomination for the "Alcohol Hall of Fame"—what are its virtues?