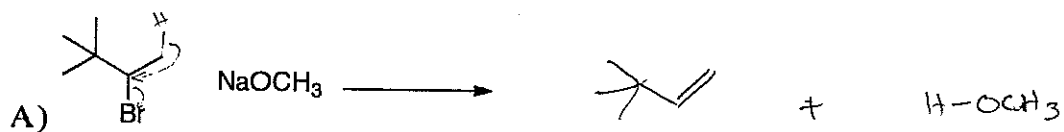
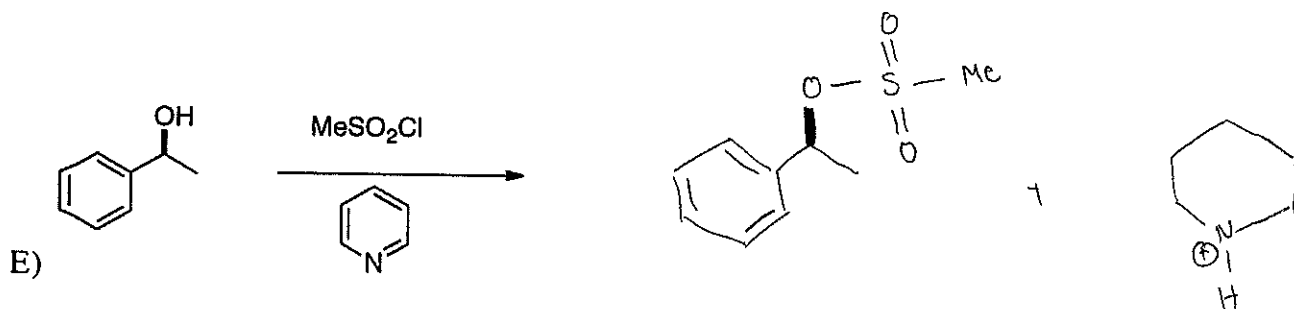
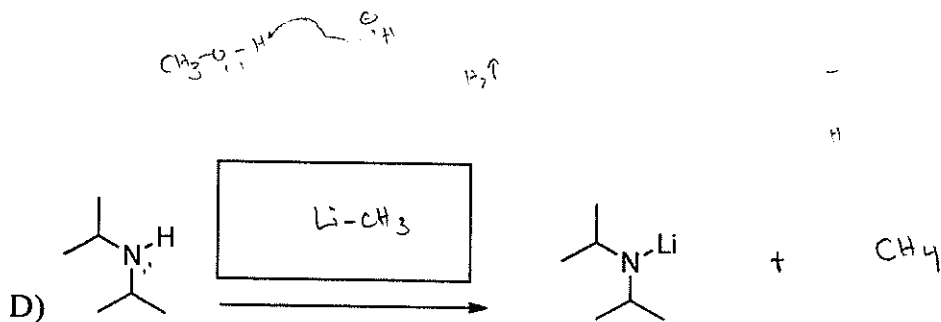
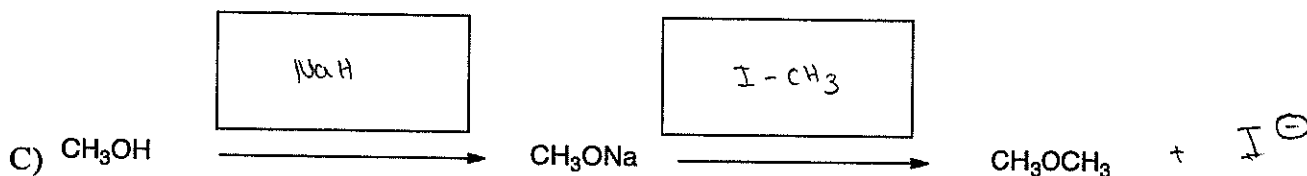
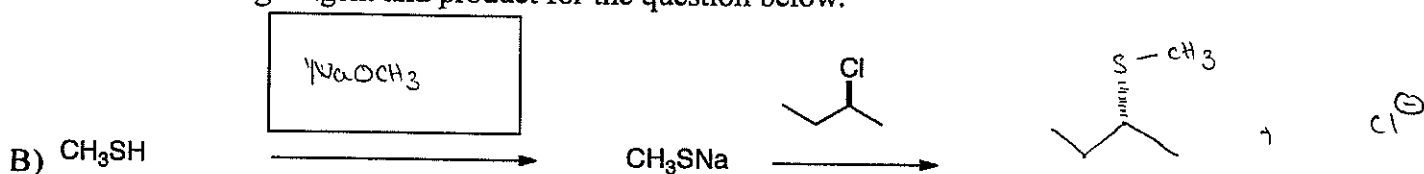


1 Provide the missing products or reagents for the following reactions. All chiral products are racemic mixtures. If a reaction would produce stereoisomers, draw the isomers and indicate if they will be produced in equal or unequal amounts (3 pts each).

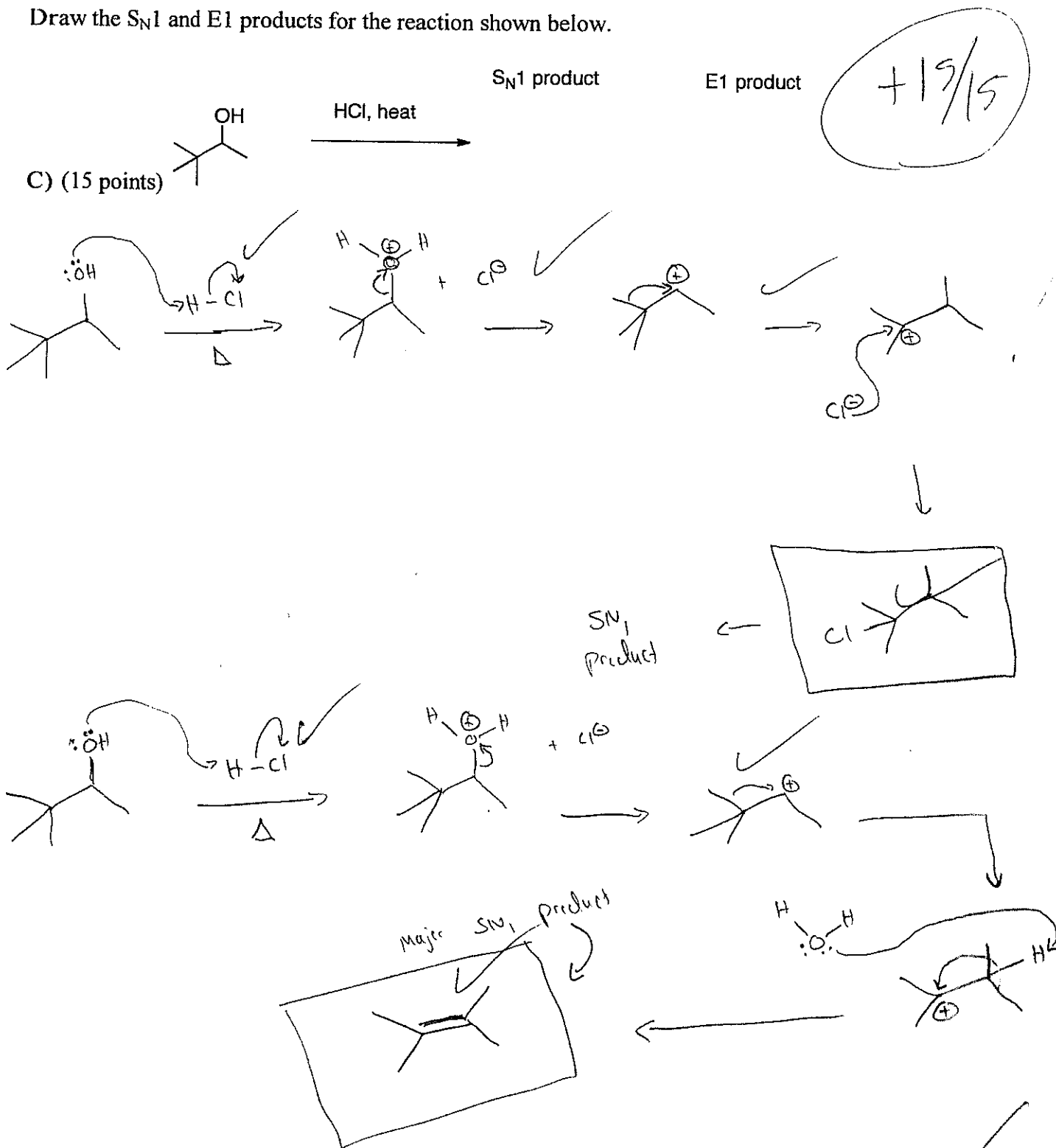


Provide the missing reagent and product for the question below.

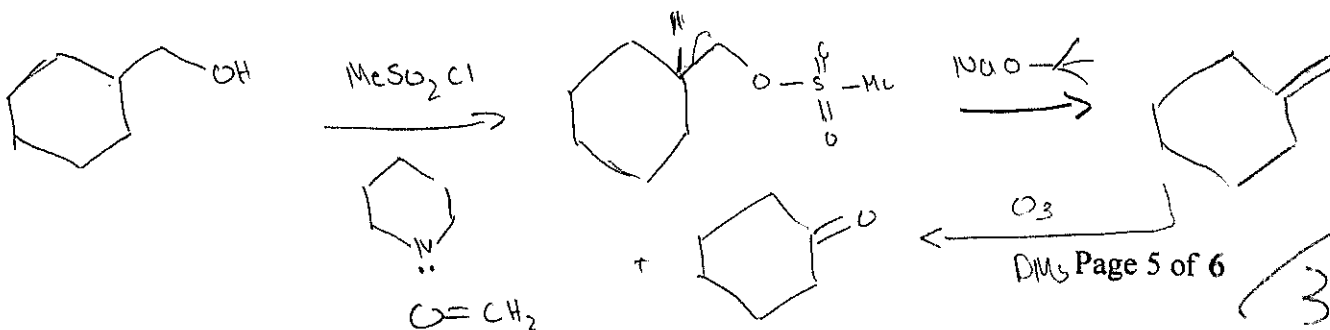
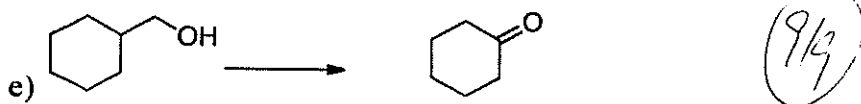
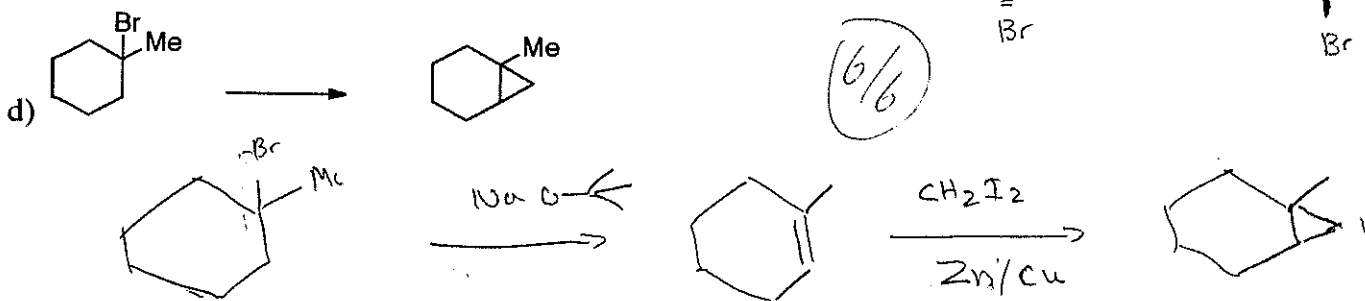
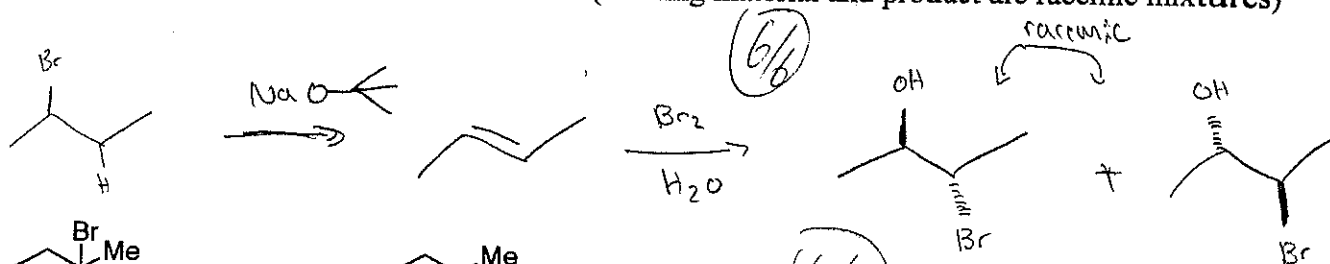
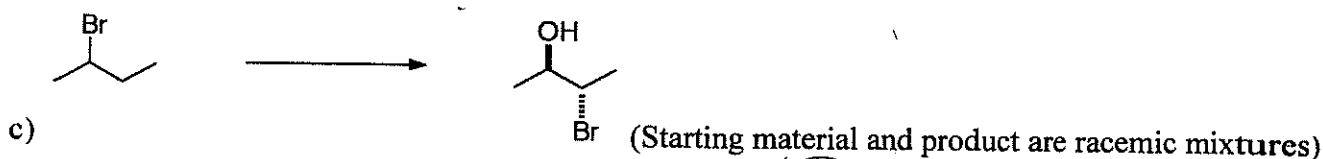
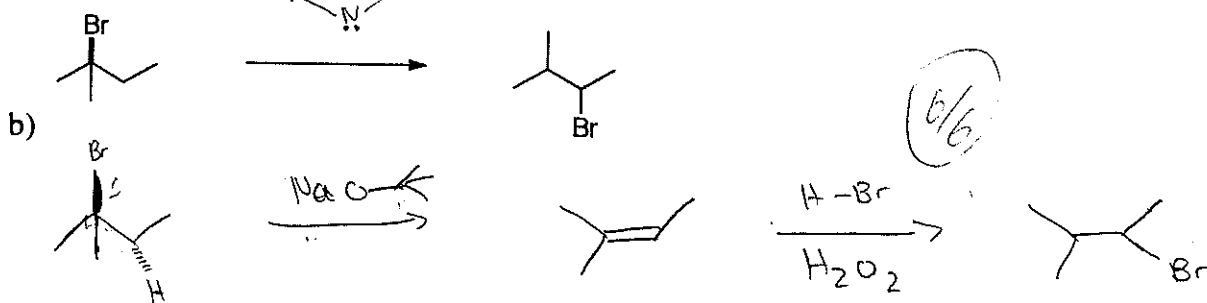
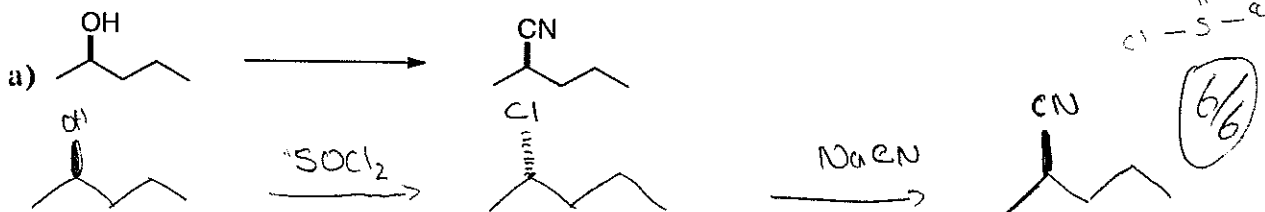


2 (continued) Provide the products and mechanisms for the following reactions. Show every intermediate and all the arrows required for each step of the reaction. If a reaction would produce stereoisomers, draw the isomers and indicate if they will be produced in equal or unequal amounts. You do not have to draw the mechanism for all stereoisomers, just one mechanism, and then draw any other stereoisomers that would be produced and give the ratio

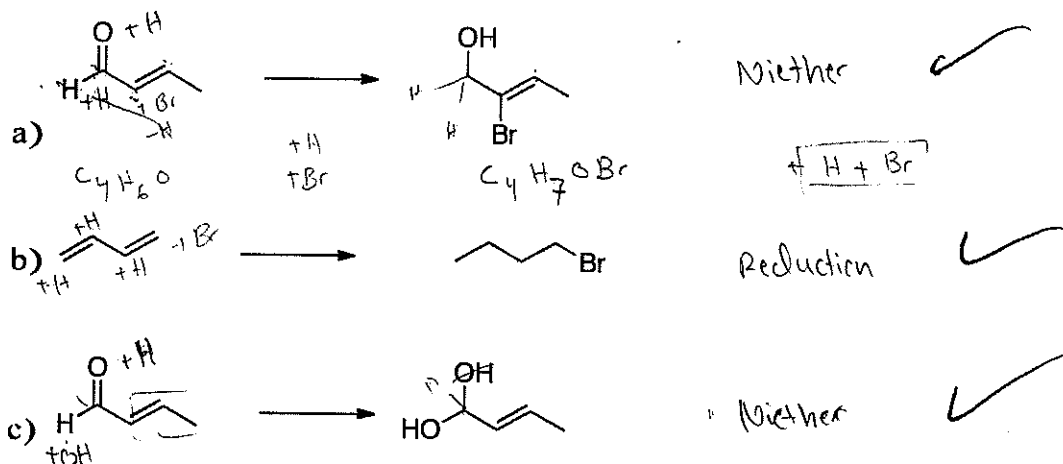
Draw the S_N1 and E1 products for the reaction shown below.



3) Complete the syntheses shown below (6 pts each, except e) which is 9 pts).



4) Are the following transformations oxidations [O], reductions [H], or neither (N)? (2 pts each)



5) Three reagent combinations are shown below.

a) Indicate if each pair can form a hydrogen bond (3 points)

b) For the ones that can form a hydrogen bond, indicate which will form the strongest hydrogen bond. (2 points)

c) For the ones that can form a hydrogen bond, draw the hydrogen bond using a dashed line to indicate the hydrogen bond. If more than one hydrogen bond is possible for a reagent combination, draw both and indicate the strongest one. (4 points)

