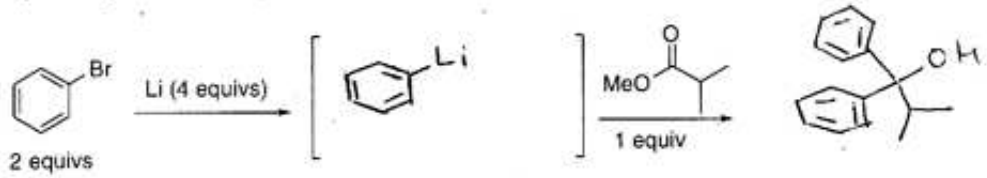
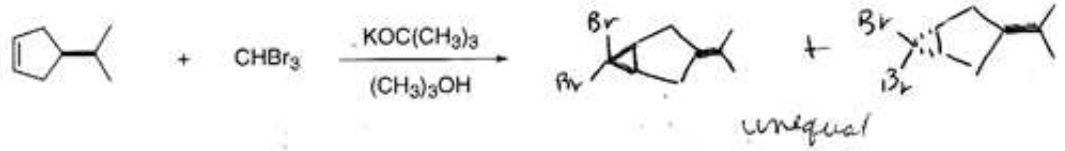
1) Provide the products of the following reactions. Draw all possible stereoisomers (i.e., draw dashed and bold lines as needed) and indicate if they would be produced in equal or unequal amounts. There is an appropriate aqueous work up for each reaction (3 points each).

A) 2 equivs

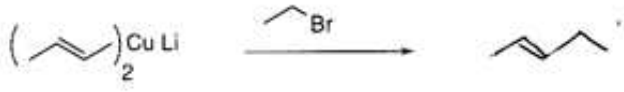


B)

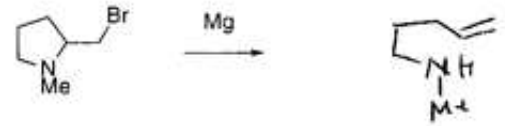


unequal

C)

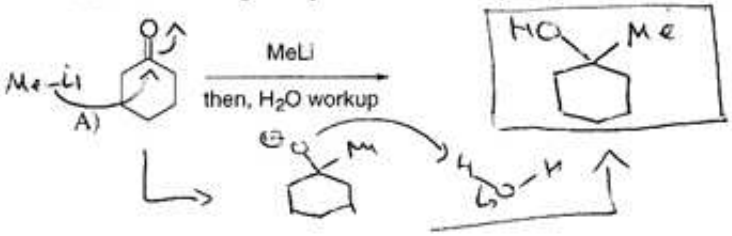


D)

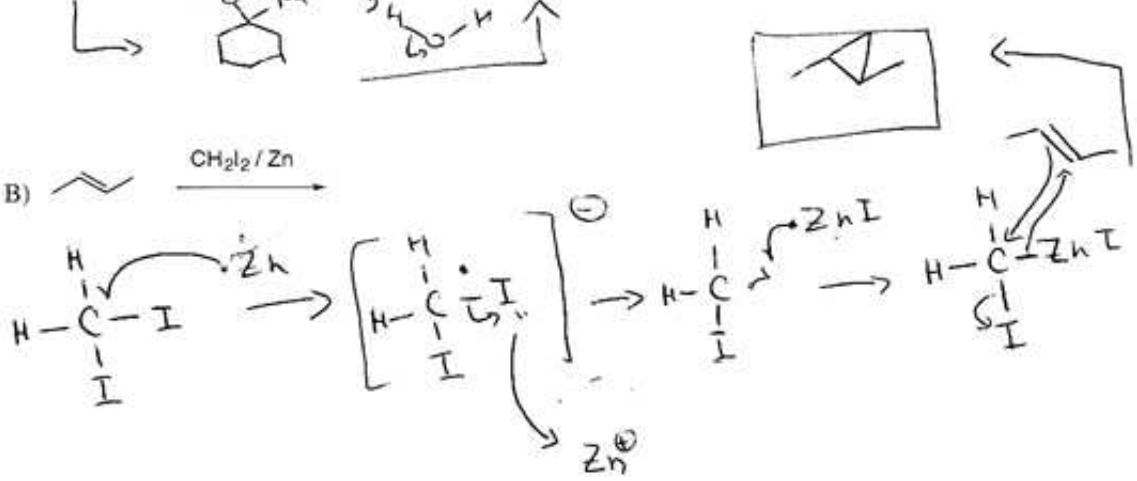


2) Provide the products and mechanisms for the reactions shown below. Be sure to show all intermediates, arrows and charges required for each step of your mechanism (A = 6 pts, B = 15 pts).

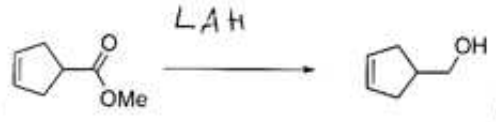
A)



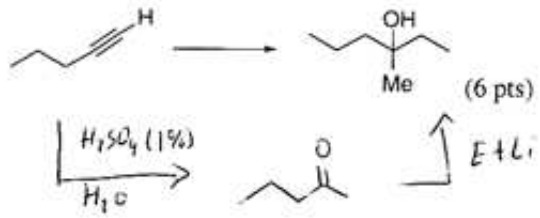
B)



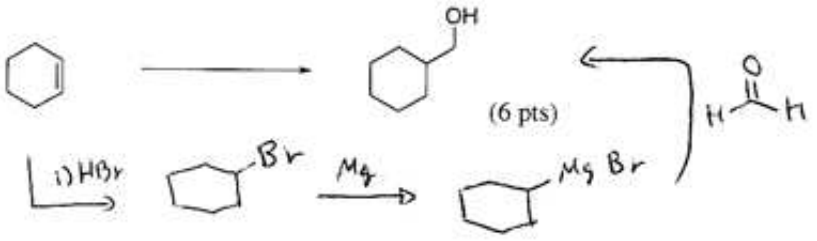
3) Complete the following syntheses in three steps or less using any inorganic reagents you need and organic reagent of 2 carbons or less. **If your synthesis requires more than one step, you must write the product of each step.** Show the number of equivalents of a reagent whenever more than one equivalent is used. All chiral products are racemic mixtures. All chiral products are racemic mixtures.

A) 

(3 pts)

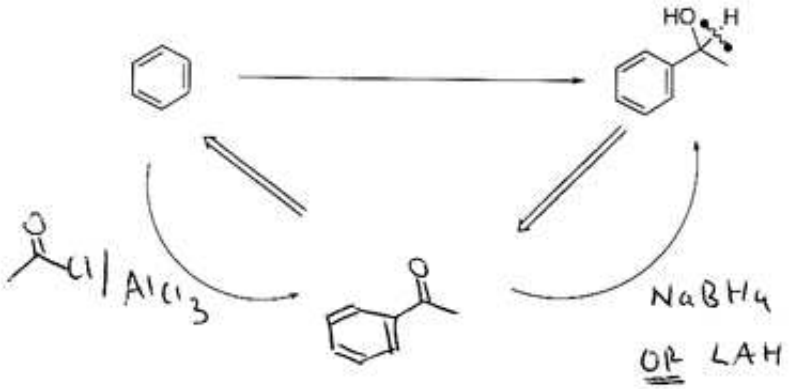
B) 

(6 pts)

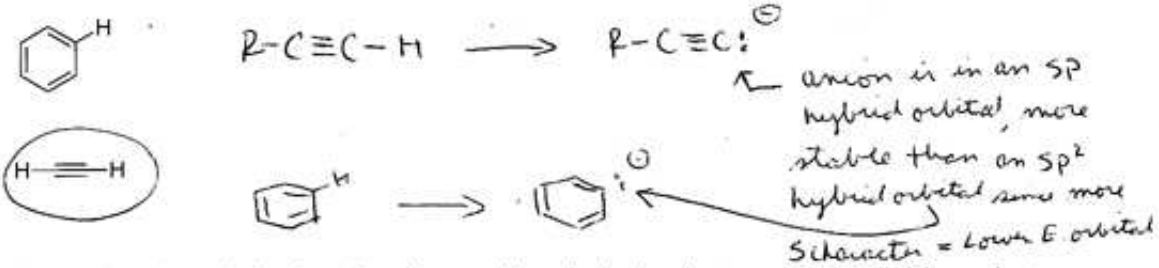
C) 

(6 pts)

4) Complete the synthesis shown below using the disconnection shown. **Please note that you have to use this disconnection, if you use another one, you will not receive credit!** Write the reagents you would use to accomplish the synthesis next to the arrows (6 pts).

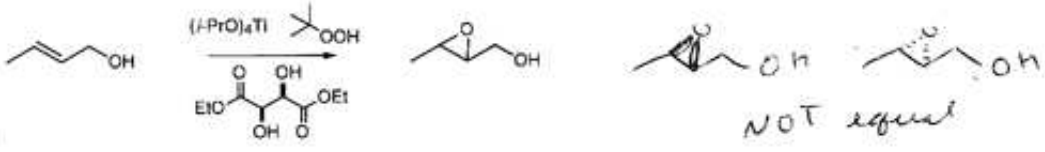


5) Circle the more acidic compound of the two show below and explain why the compound you circled is more acid in **two sentences or less** (2 + 5 pts)

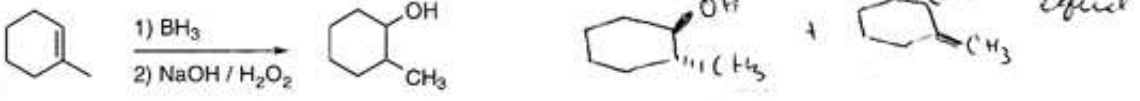


6) The reactions shown below have been drawn without indicating the stereochemistry of the products. Indicate the stereochemistry of the products, and draw all the stereoisomers that would be formed and indicate if they will be formed in equal or unequal amounts. Note that if a stereoisomer cannot be produced (due to the mechanism of the reaction or for other reasons) then DO NOT draw any other stereoisomer (2 pts each).

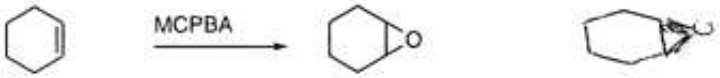
A)



B)

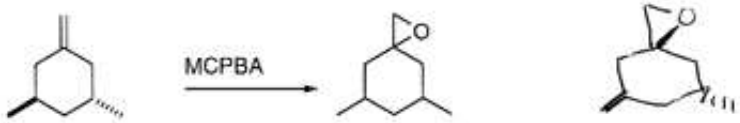


C)



D)

E)



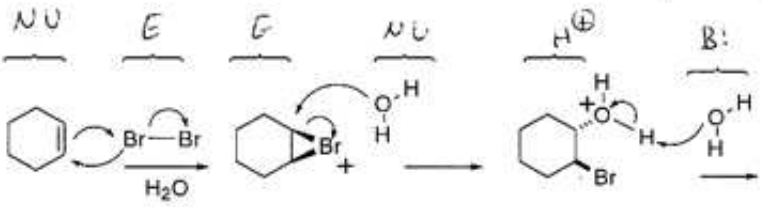
F)

7) Describe each reactant in each step of the three step reaction shown below as either a nucleophile or an electrophile or an acid or a base (pick one for each reactant in each step). Also, in each step of the reaction, a filled orbital initiates the reaction by attacking an empty orbital. For each step, indicate the filled orbital that initiates the attacking, and the empty orbital that is undergoing attack. You may chose from the following orbitals:

σ C-C; σ* C-C; σ C-O; σ* C-O; π C-C; π* C-C; σ Br-Br; σ* Br-Br; π Br-Br; π* Br-Br; σ C-Br;

σ* C-Br; σ O-H; σ* O-H; O lone pair; C lone pair. (24 pts total).

Label each reactant beneath the brackets as either a:
nucleohpile
electropile
acid
base
(pick one for each)



The orbital that is doing the attacking is the: π C-C | O L.P. | O L.P.

The orbital that is being attacked is the: σ* Br-Br | σ* C-Br | σ* O-H

HINT: Do not choose Br lone pair for any of your answers.