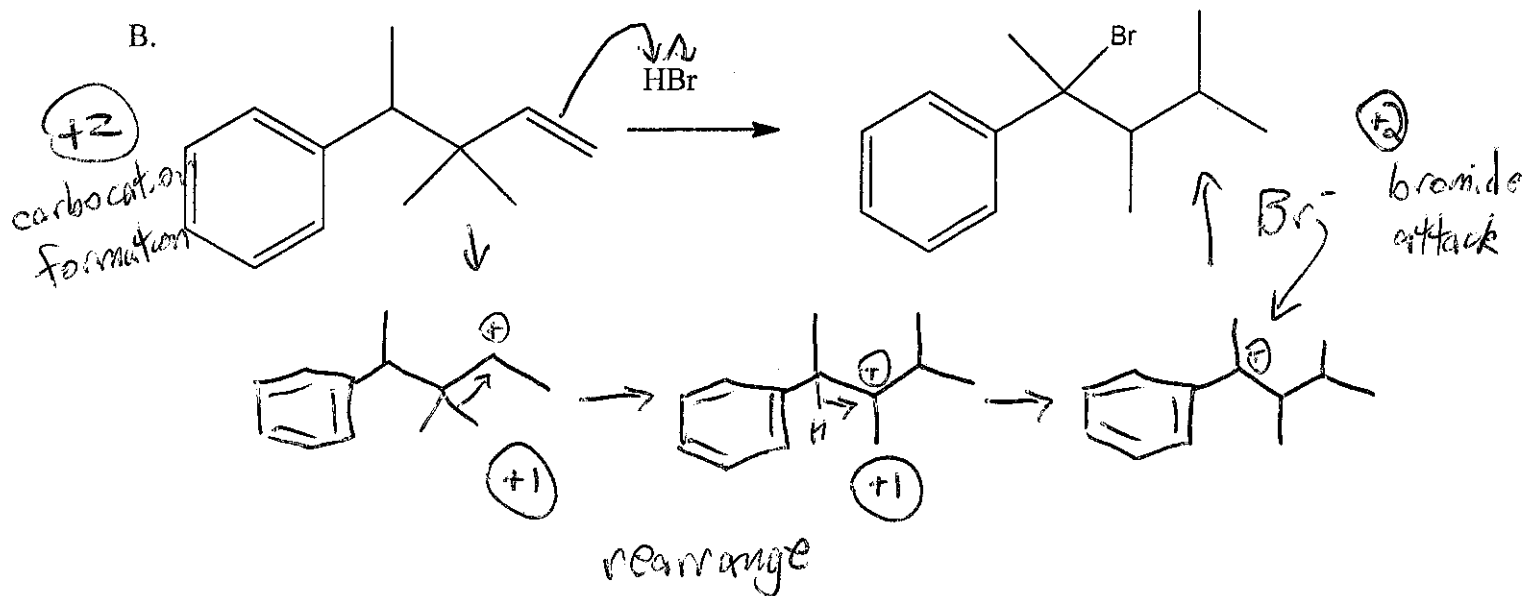
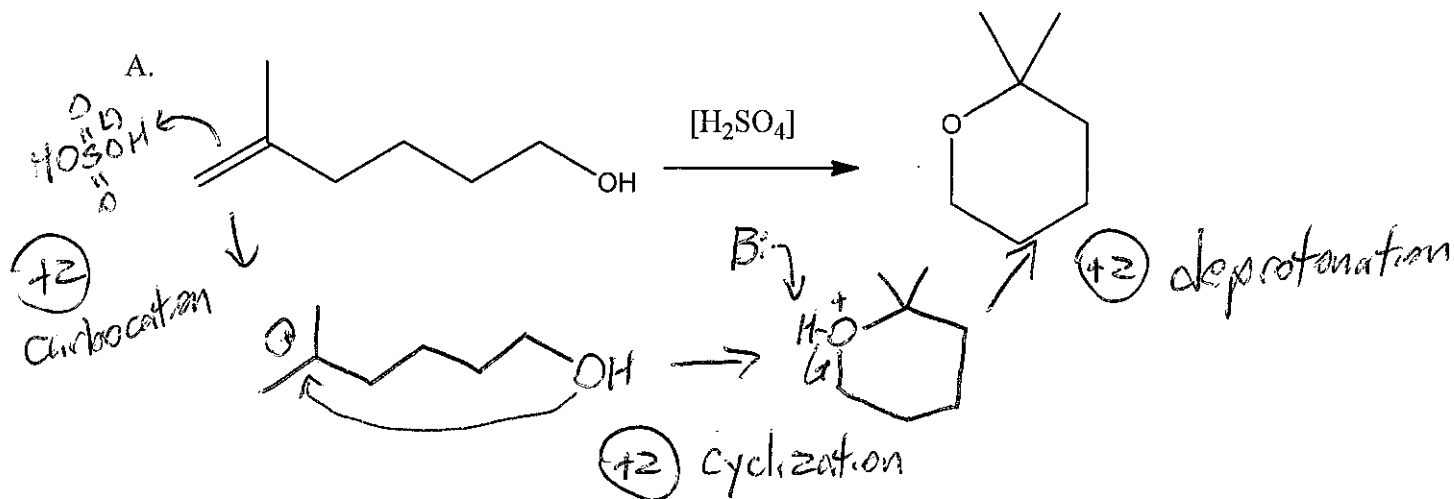
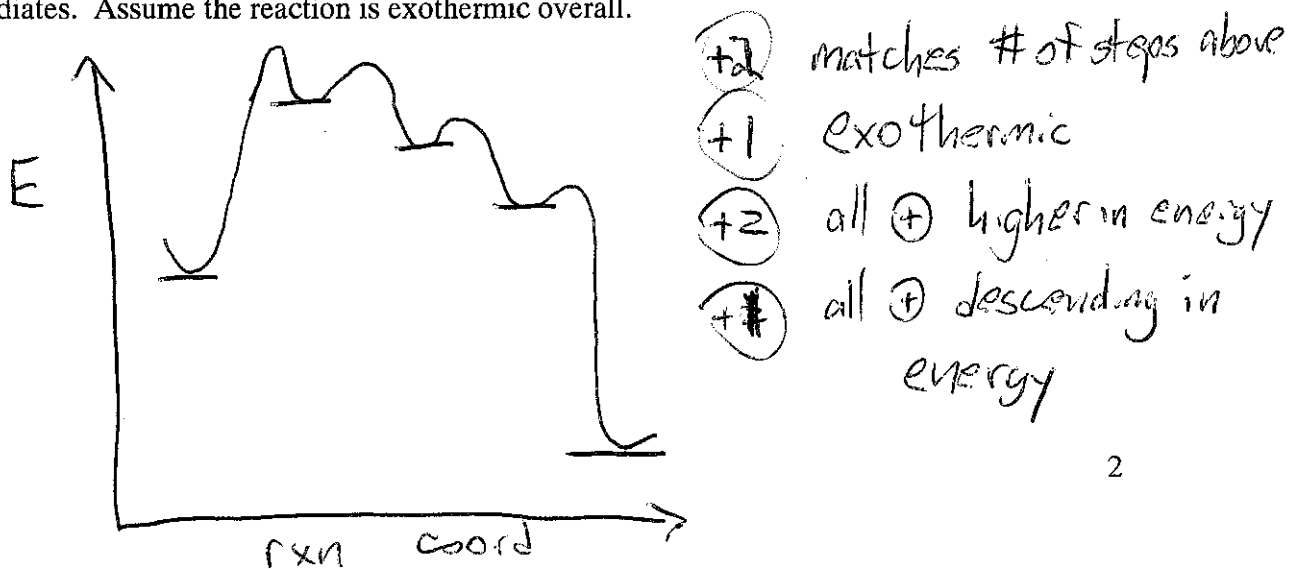


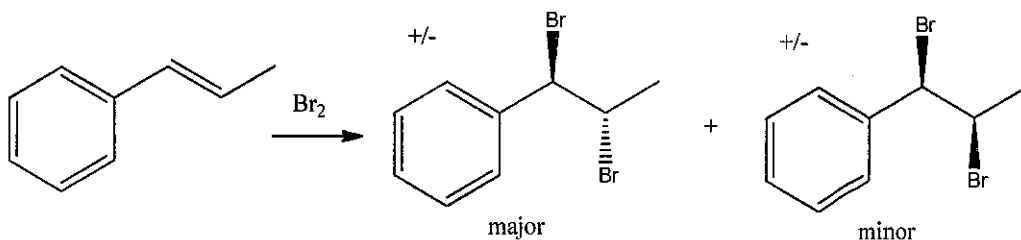
1. (18pts) Draw arrow mechanisms for parts A and B, including all intermediates and arrows.



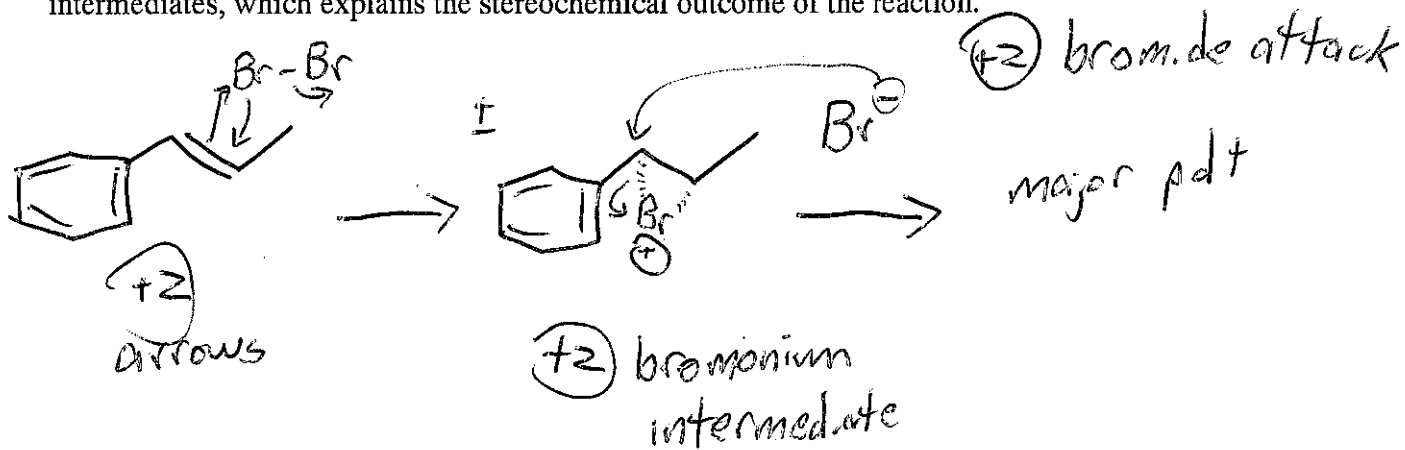
C. Draw an energy diagram for the reaction in Part B, including proper relative energies of all intermediates. Assume the reaction is exothermic overall.



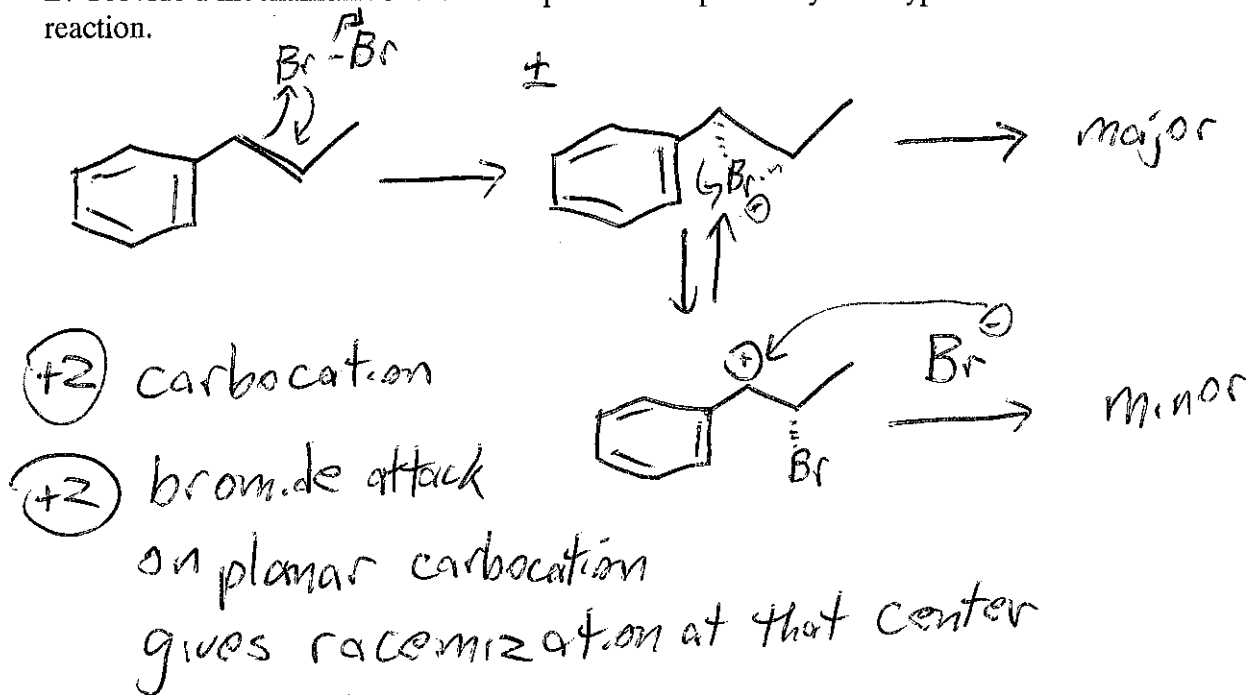
2. (10pts) Typically, addition of Br<sub>2</sub> is only *anti*. In this case, however, there is a significant amount of the *syn* addition product as well.



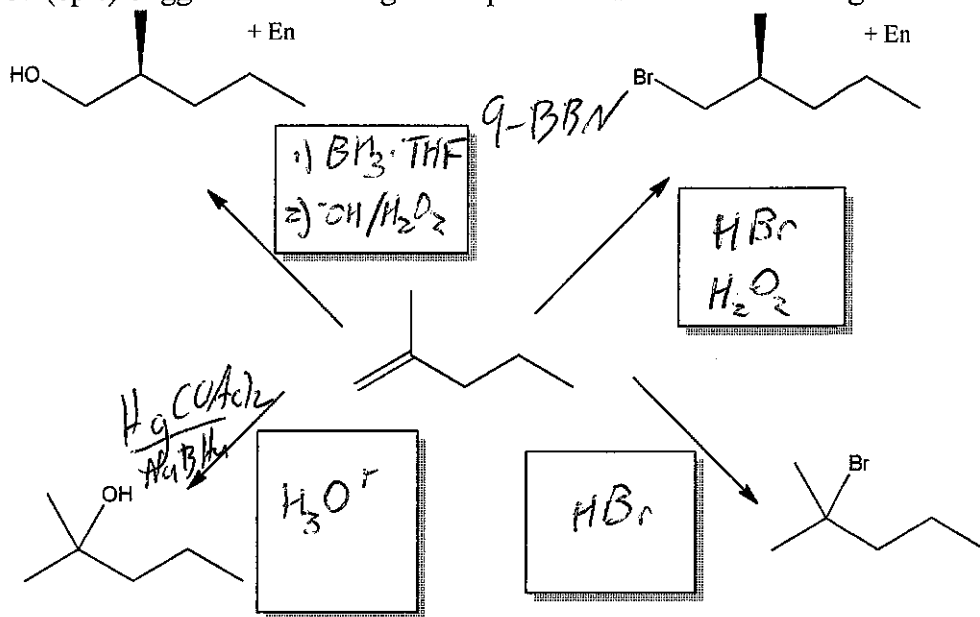
+6 A. Provide a mechanism for the formation of the major product, including all arrows and intermediates, which explains the stereochemical outcome of the reaction.



B. Provide a mechanism for the minor product. Explain why this atypical result is seen in this reaction.

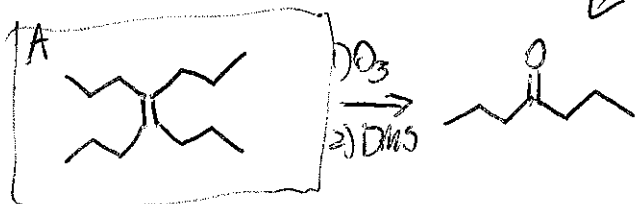


3. (8pts) Suggest suitable reagents to perform each of the following transformations.

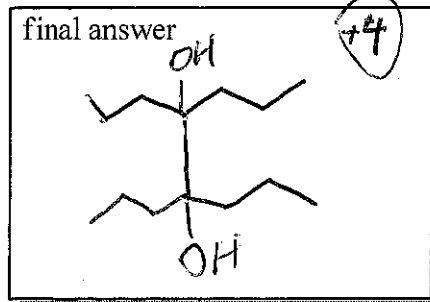
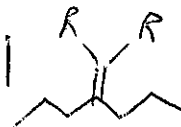


4. (4pts) Compound A is an alkene that was treated with ozone (followed by DMS) to yield only 4-heptanone. Draw the major product that is expected when compound A is treated with MCPBA followed by aqueous acid ( $\text{H}_3\text{O}^+$ ).

Partial credit

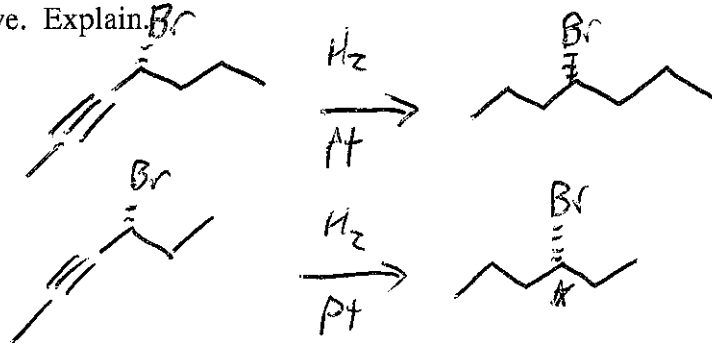


+2 Any reasonable diol



5. (4pts) When (R)-4-bromohept-2-yne is treated with  $\text{H}_2/\text{Pt}$ , the product is optically inactive. Yet, when (R)-4-bromohex-2-yne is treated with the same conditions, the product is optically active. Explain.

(44)

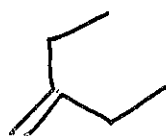


achiral - no longer a chirality center

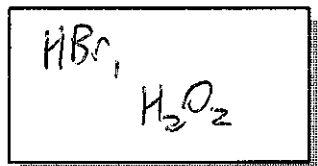
chiral, and optically active

6. (12pts) Choose 3 of the following 4 reactions and provide the necessary reagents. Put an "X" in the box you do not want graded, or else the first three will be grade.

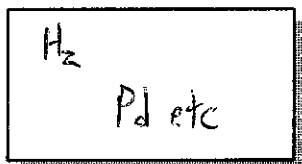
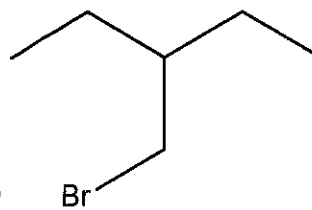
4  
each



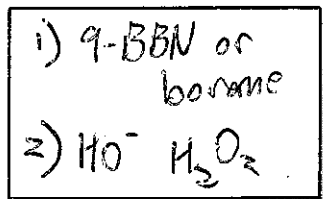
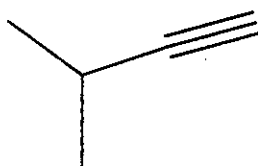
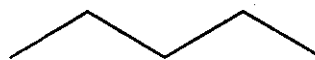
2-ethylbut-1-ene



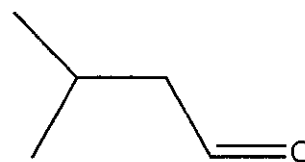
HBr  
+3



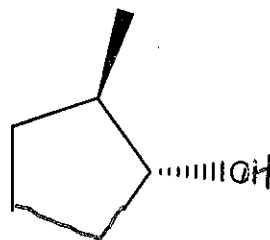
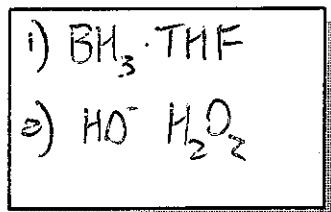
H<sub>2</sub> Lindlar  
NaBH<sub>4</sub>(D)  
+2



H<sub>3</sub>O<sup>+</sup>  
+2

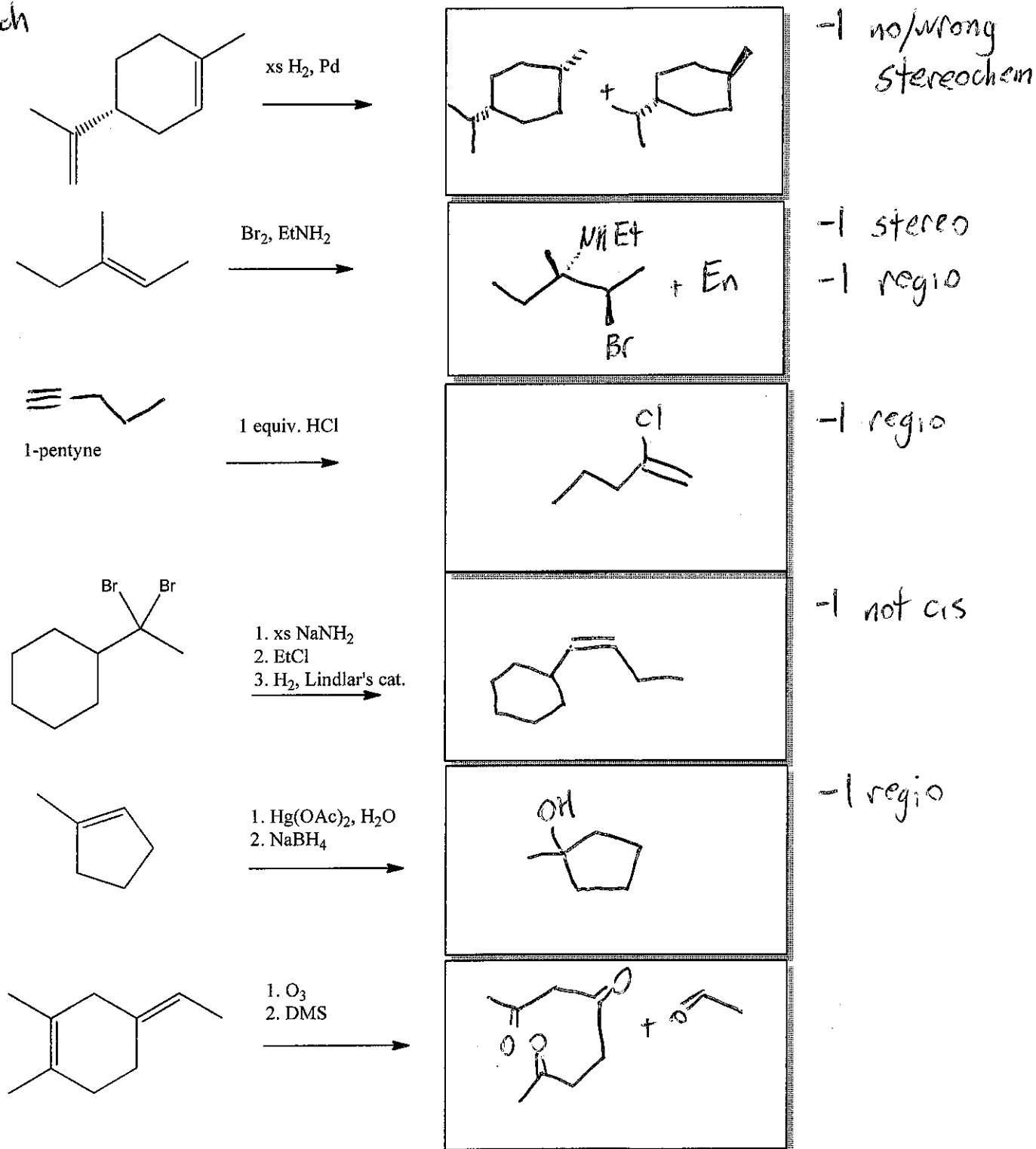


1-methylcyclopentene

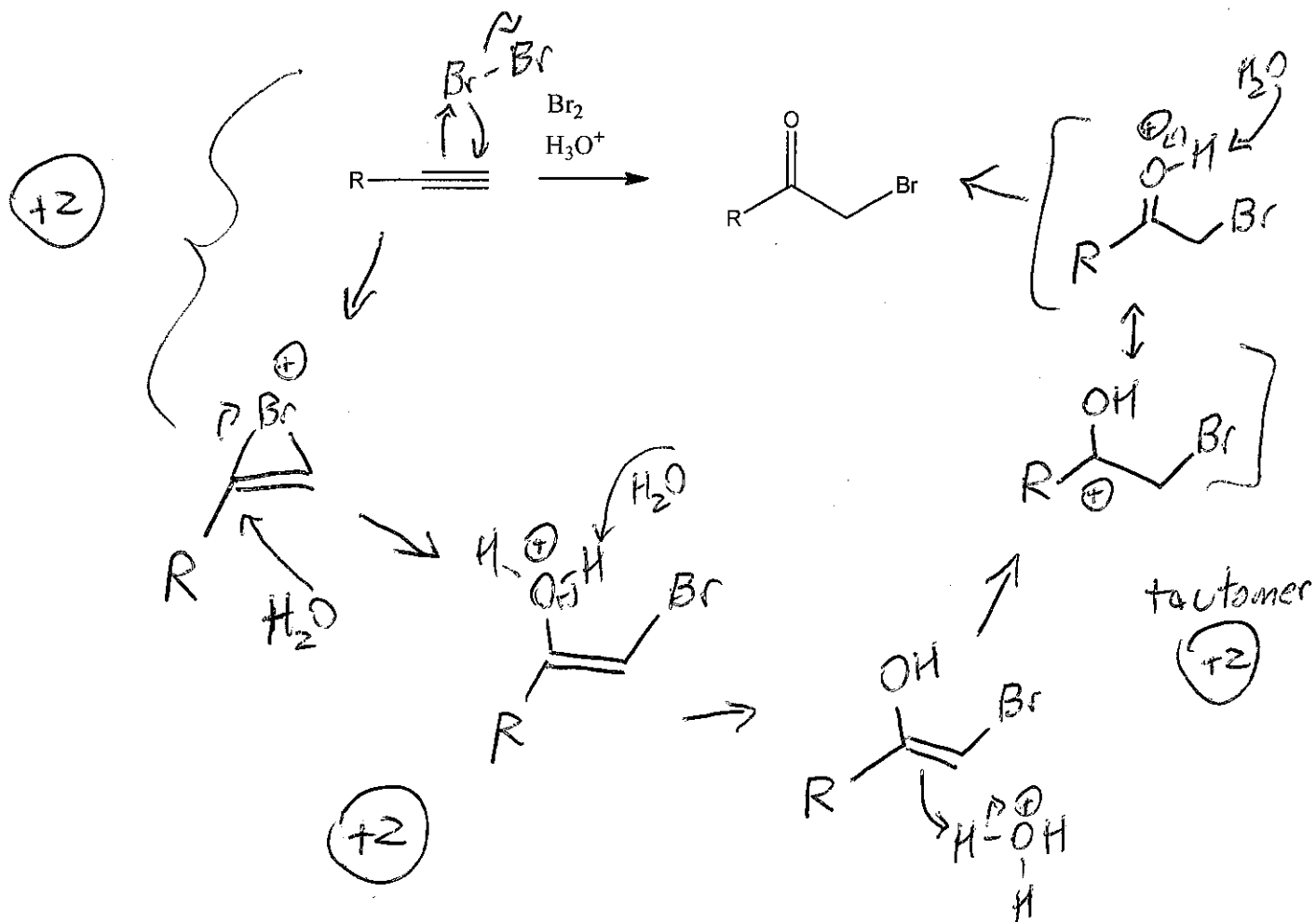


7. (20pts) Predict the major product(s) of 5 of the following 6 reactions. Be sure to include proper stereochemistry. Put an "X" in the box you do not want graded, or else the first 5 will be graded.

+4 each

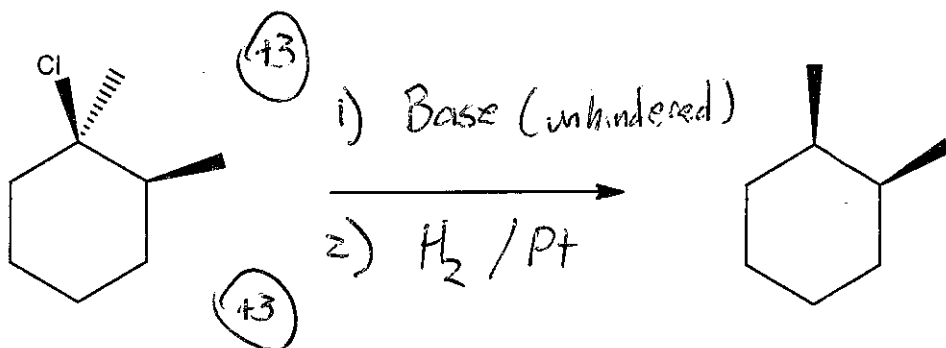
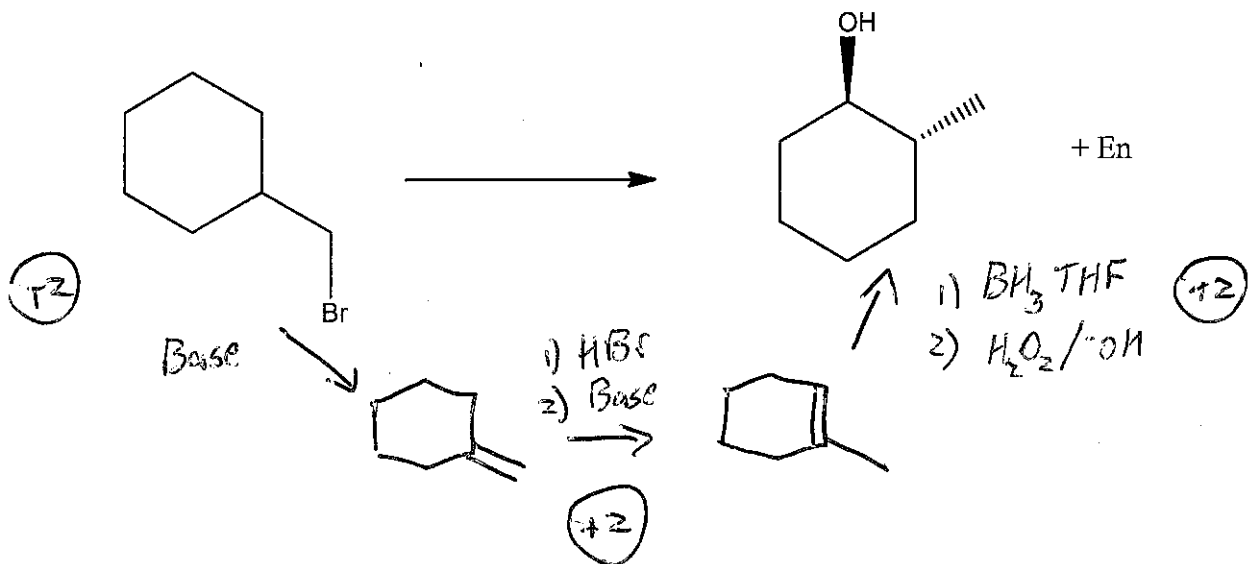
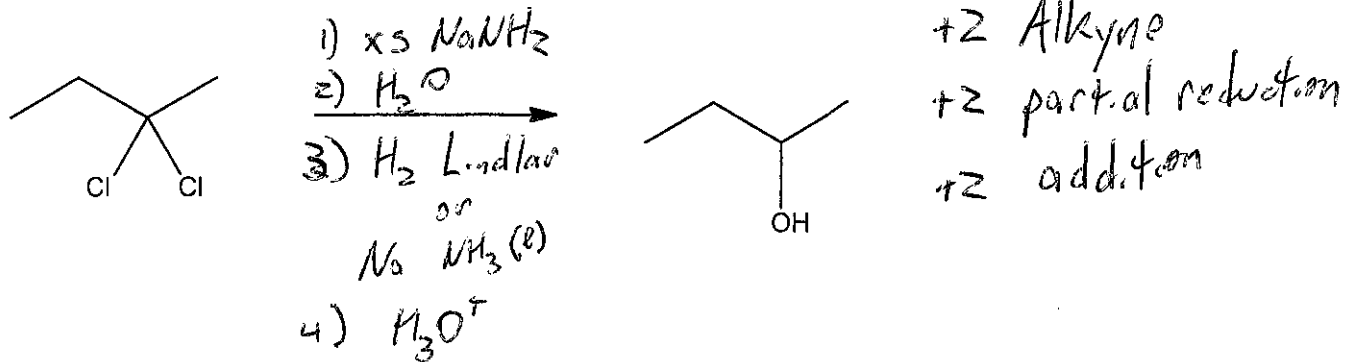


8. (6pts) Provide a mechanism, including all intermediates and arrows, to explain this reaction.

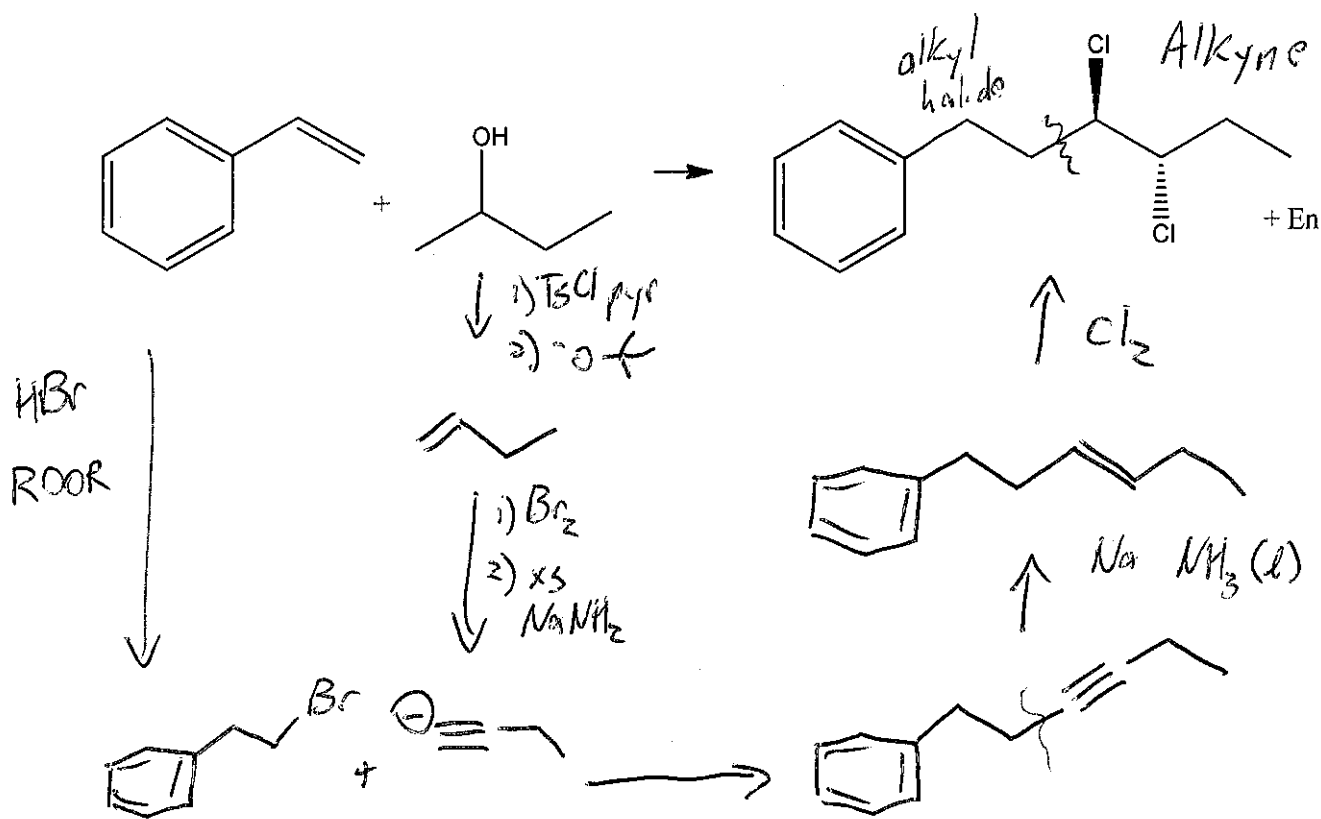


+6 each

9. (18pts) For the following three syntheses, provide all reagents necessary to complete the transformation from the starting material to the product.



10. (10pts) Using the following compounds as your carbon sources, propose a multistep synthesis to produce the target compound. You may use any other reagents you need. Show reagents with intermediates to receive partial credit.



+2 transform C=Cc1ccccc1  
 +2 transform CC(O)CC  
 +3 Key C-C formation (-2 for wrong alkene)  
 +3 Stereochem of dichloride

Alternate paths

\* not using carbon source } +7