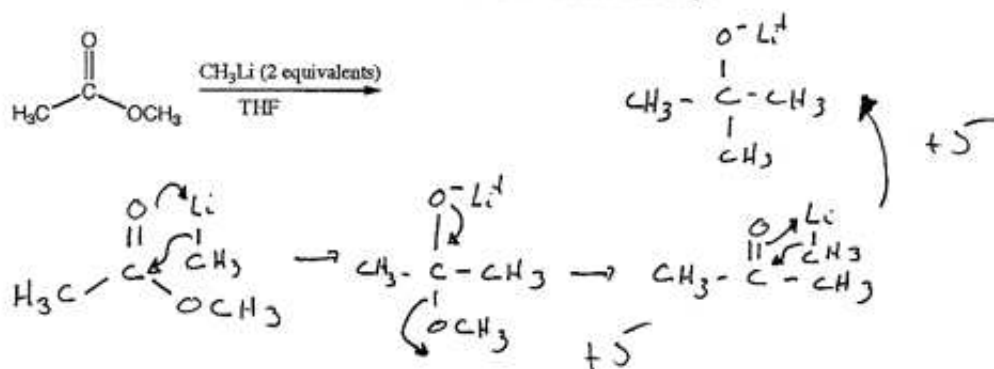
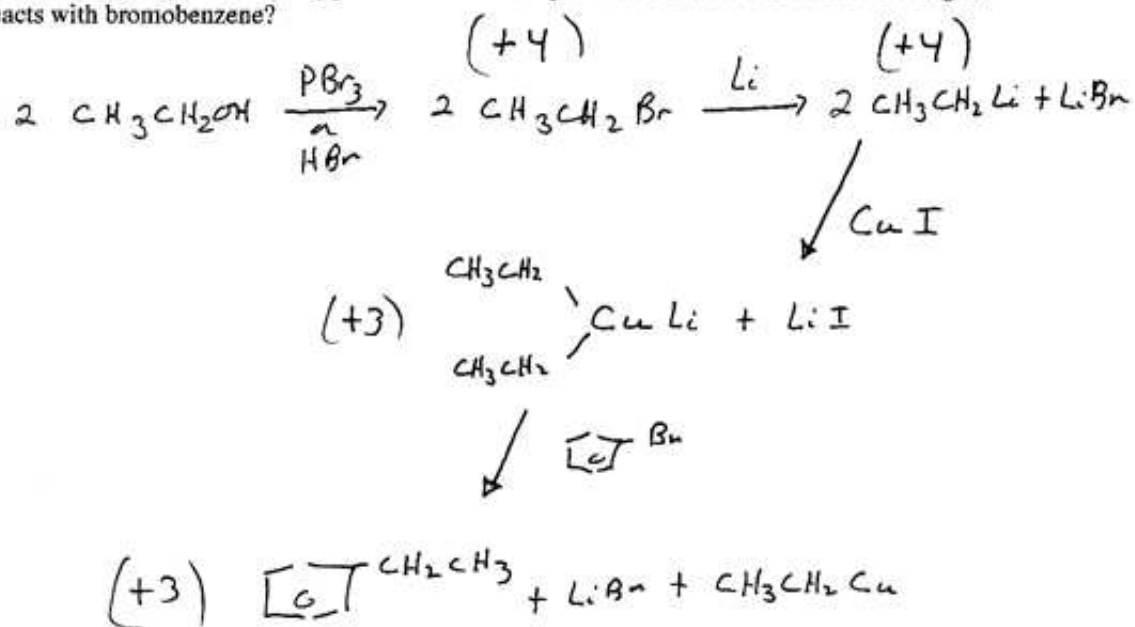


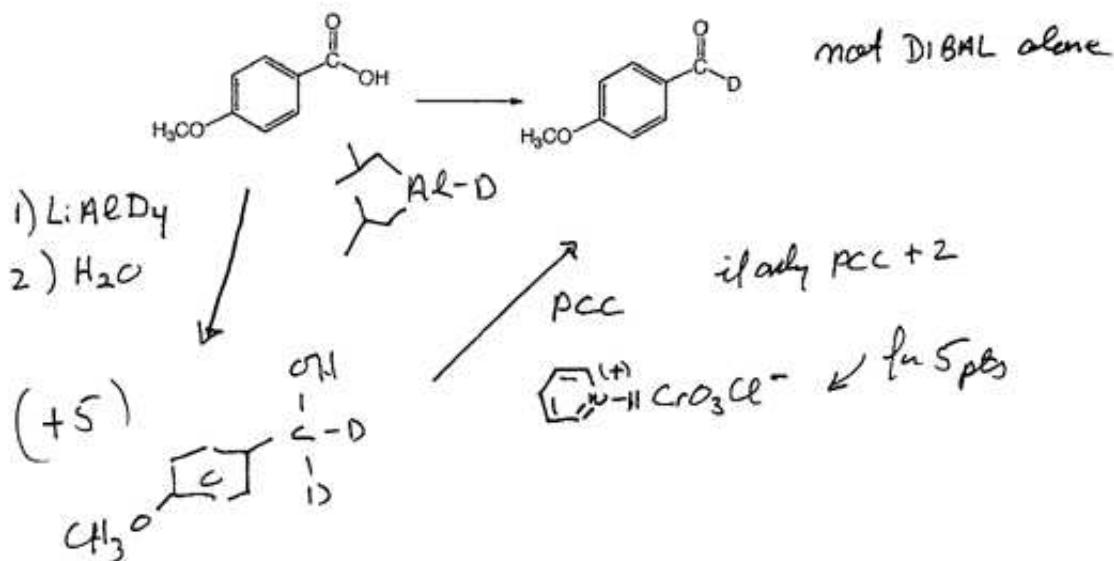
Problem 1. (10 points) Provide the product and show the mechanism for the following reaction. Be sure to show all the intermediates and the arrows for each step.



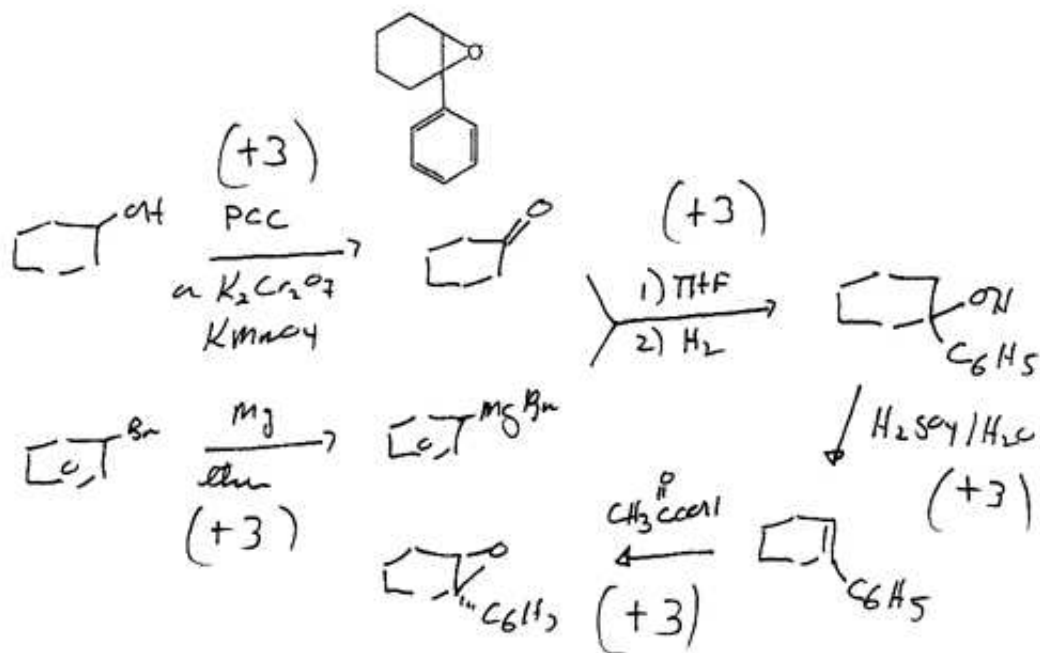
Problem 2. (15 points) Using ethanol as your only source of carbon, how would you synthesize the following reagent, $(\text{CH}_3\text{CH}_2)_2\text{CuLi}$? What is the product of the reaction when this reagent reacts with bromobenzene?



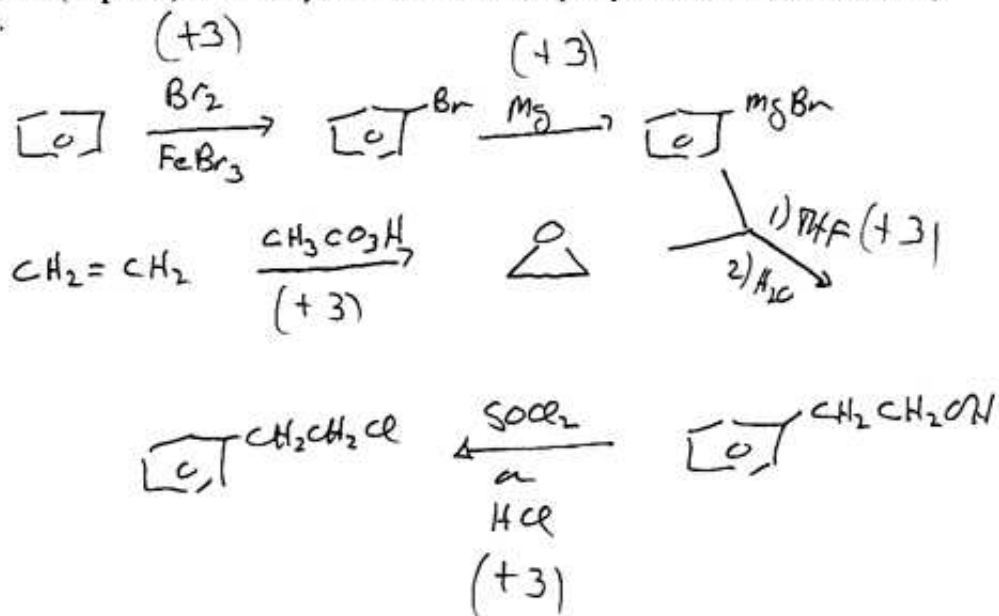
Problem 3. (10 points) How would you carry out the following reaction. Do not show the mechanisms of the reactions.



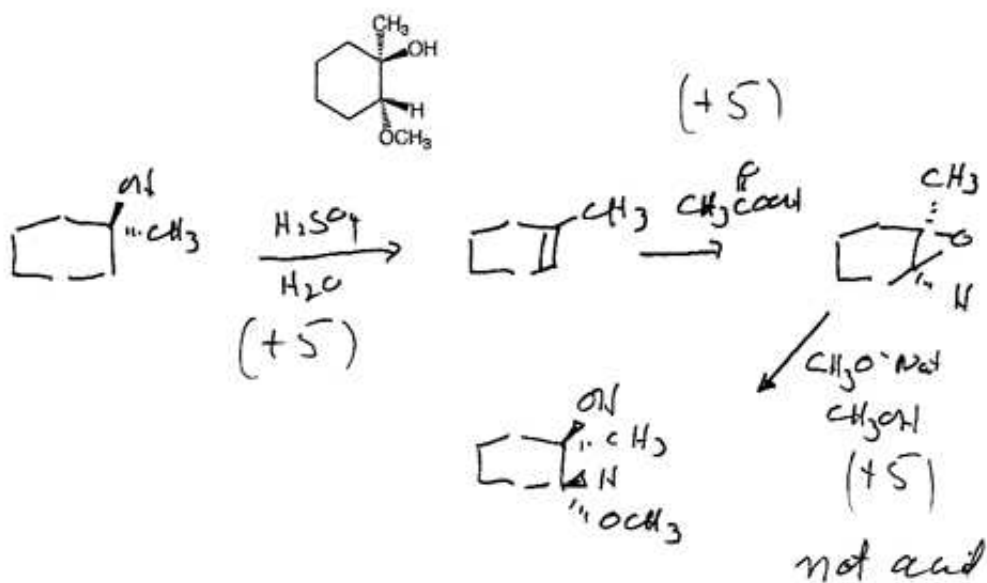
Problem 4. (15 points) How would you synthesize the following molecule starting with bromobenzene and cyclohexanol as your only source of carbon?



Problem 5. (15 points) Outline a synthesis for 1-chloro-2-phenylethane from benzene and any alkene.



Problem 6. (15 points) Starting with 1-methyl-cyclohexanol, how would you synthesize the following compound.



Problem 7. (20 points) Give the products for the following reactions:

