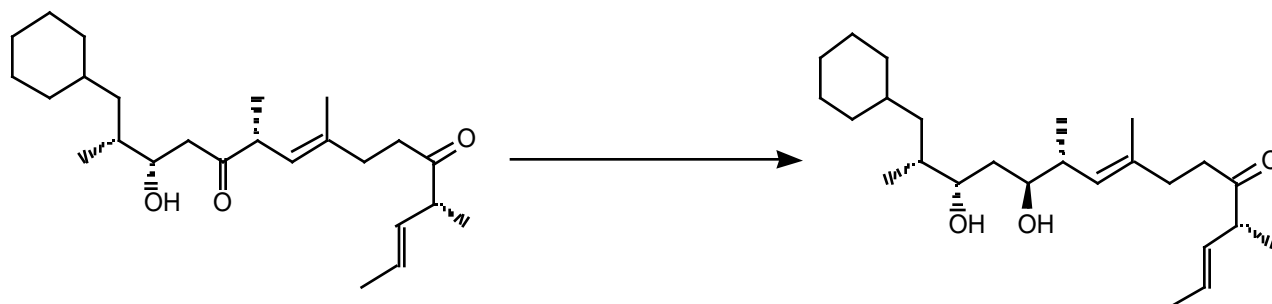
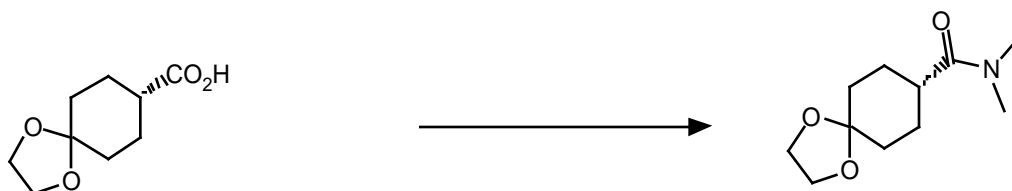
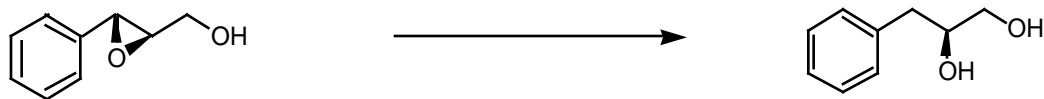
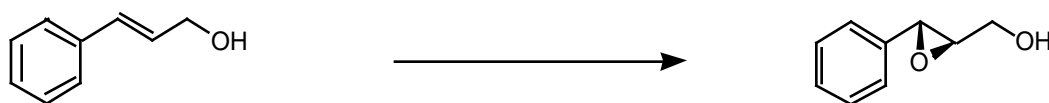
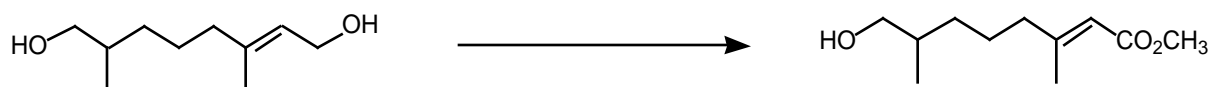
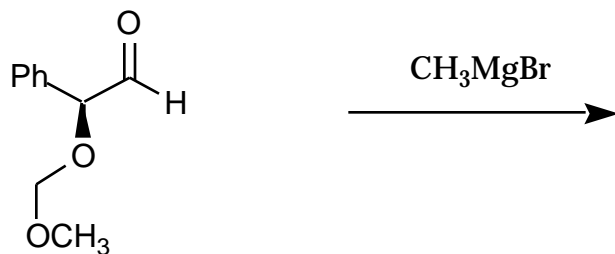
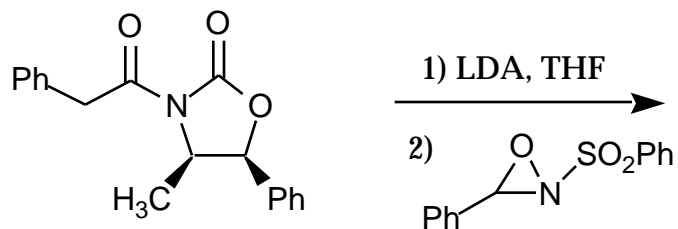
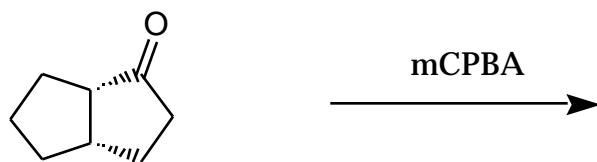
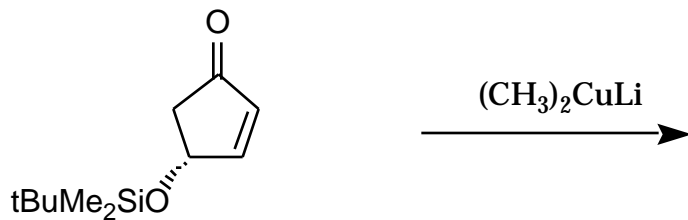
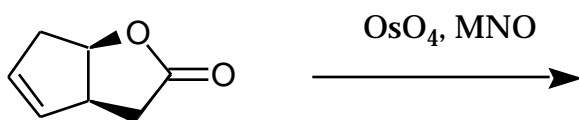


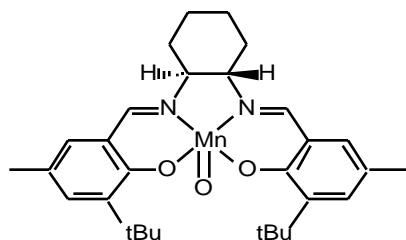
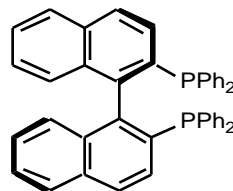
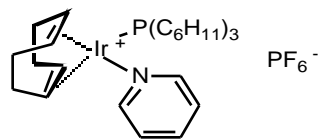
1. Give the reagent(s) necessary to carry out the following transformations. The stereochemistry of the products and reactants is as shown. (20 pts)



2. Give the product of the following reactions. The stereochemistry of the reactant is as shown. Give the proper stereochemistry of the major stereoisomer of the product. (20 pts)

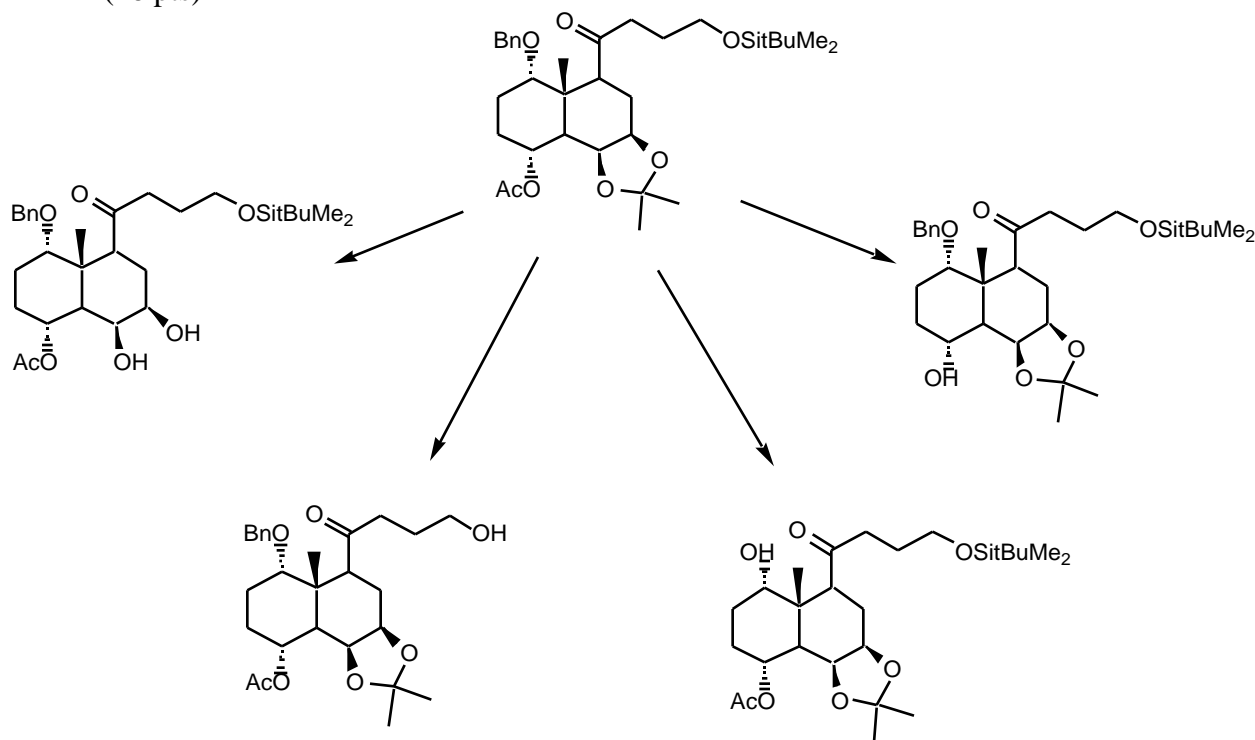


3. What are the following reagents used for. Please be specific. (8 pts each)

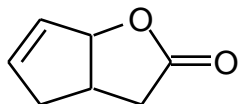


Bu_2BOTf , iPr_2NEt

4. Give the reagent(s) needed to selectively deprotect the substrate below to the desired product. (16 pts)



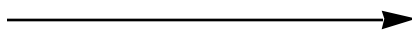
5. Provide the product and all intermediates for the following sequence of reactions. (20 pts)



1) LiAlH_4

2) MnO_2

3) $\text{tBuMe}_2\text{SiCl}$, pyridine



4) $p\text{CH}_3\text{C}_6\text{H}_3\text{SO}_2\text{NHNH}_2$

H^+ , C_6H_6 (- H_2O)

5) NaCNBH_3

6. Starting from cyclohexanone, provide a feasible synthesis target shown. Give all reagents and intermediates. (16 pts)

