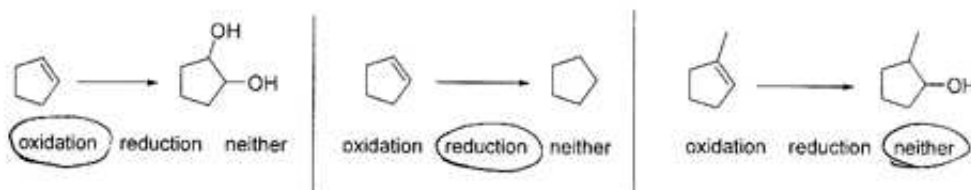
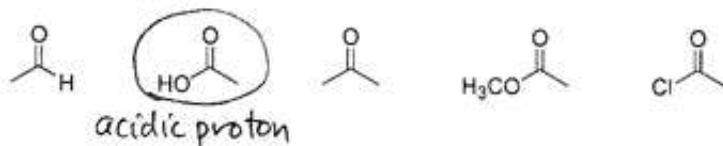


1a) Circle the correct word to indicate whether each of the following transformations is an oxidation, a reduction, or neither (6 pts).



1b) Circle the compound in the following series that is *not* an appropriate electrophile for a Grignard reaction (3 pts).



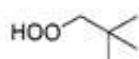
1c) Circle the compound in the following series that cannot be oxidized using sodium dichromate, acetone, sulfuric acid and water (3 pts):



1d) Circle any and all words that describe Wilkinson's catalyst (4 pts):

heterogeneous chiral achiral homogeneous hydrogenation
 oxidation reduction nucleophilic hydride source

1e) Put an "X" through any of the following individuals that is *not* a friend of osmium tetroxide (1 pt):



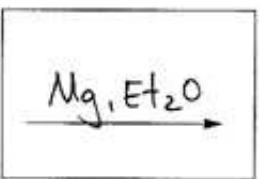
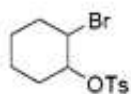
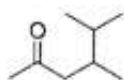
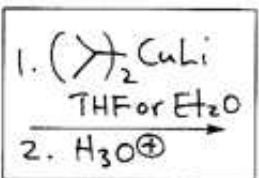
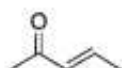
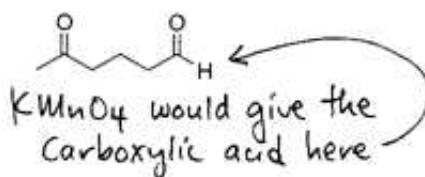
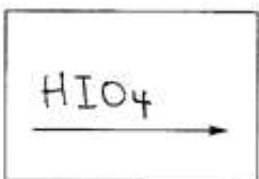
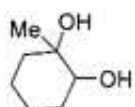
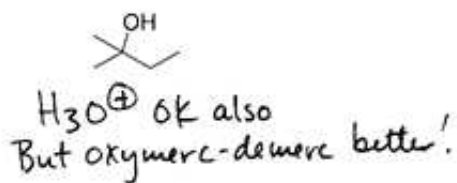
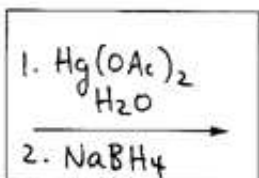
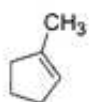
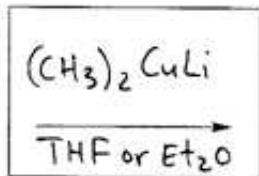
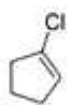
NaOH



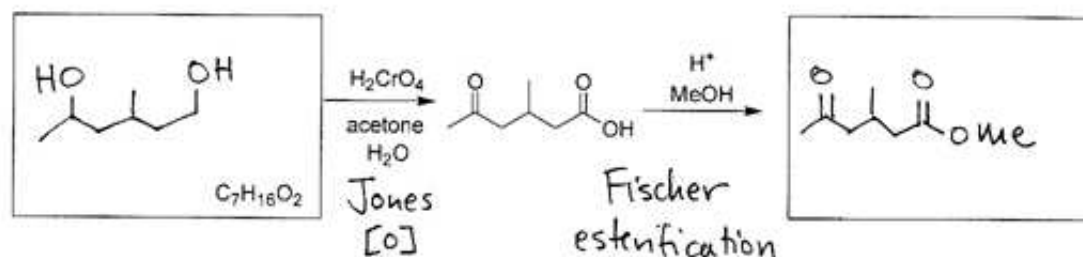
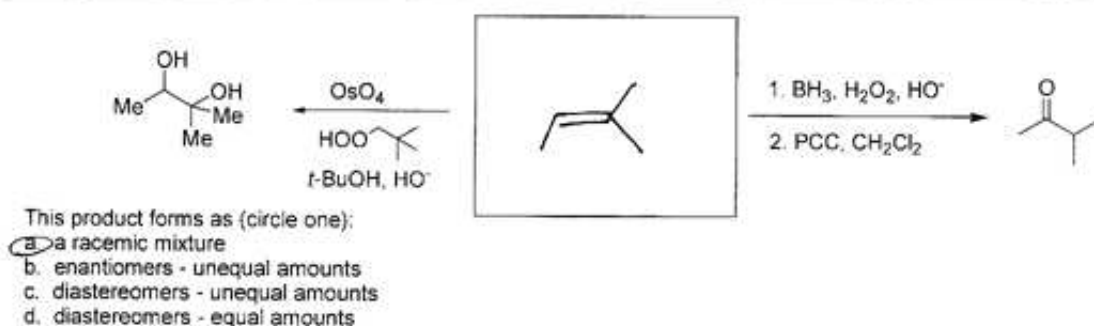
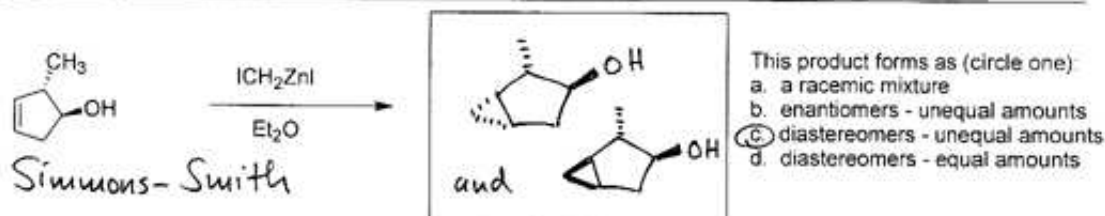
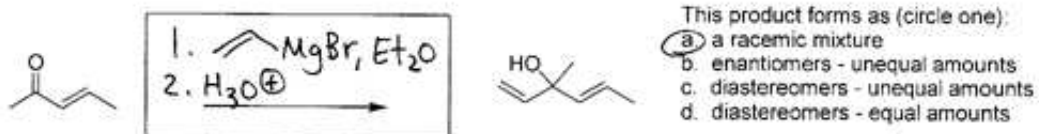
1f) **True** (circle one) False (circle one) There is a vicinal diol *and* a geminal diol on this page. (1 pts)

in #1a in #1c

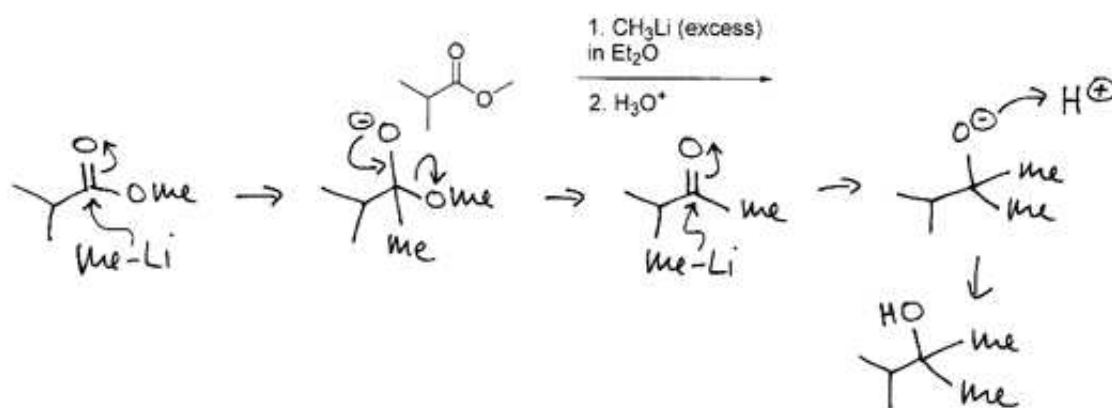
2. Provide the missing reagents for the following transformations. (20 pts).



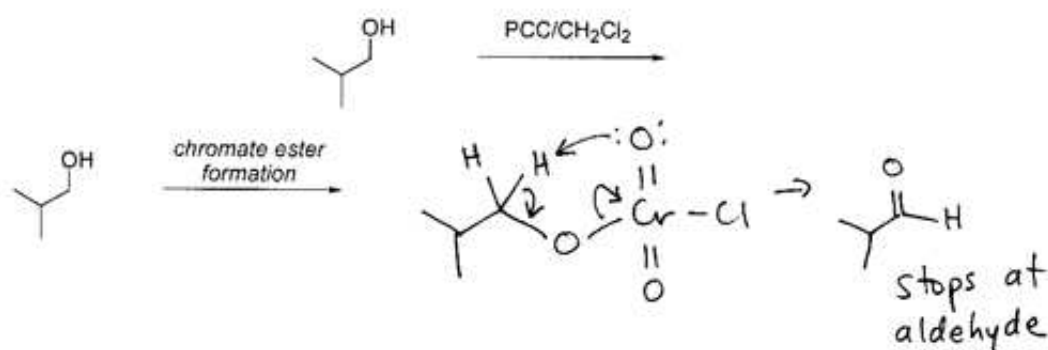
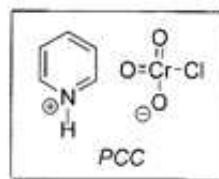
3. Provide the missing product, reagent, or starting material for each of the following transformations, and indicate the stereochemical nature of the product(s). If a reaction produces more than one stereoisomer, just draw one of them (16 pts).



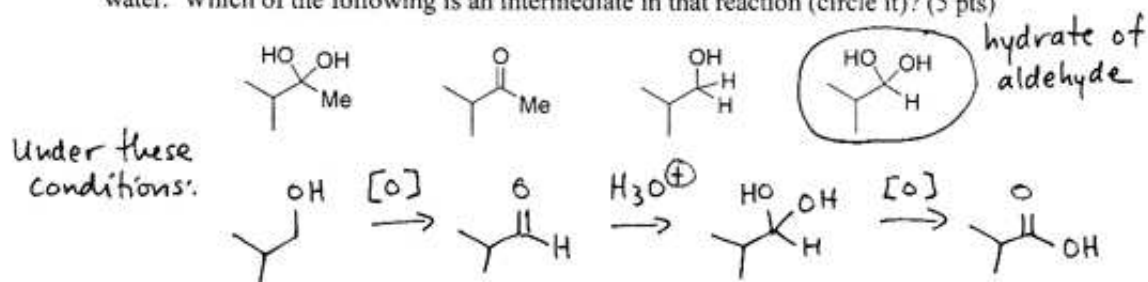
4a) Predict the product and draw an arrow-pushing mechanism for the following transformation. Show all bonds, arrows, formal charges and necessary lone pairs clearly to receive full credit (10 pts).



4b) Predict the major organic product and draw an arrow-pushing mechanism for the following transformation. The first step is shown (you do not have to show how to form the chromate ester, but you need to draw the mechanism). Show all bonds, arrows, formal charges and necessary lone pairs clearly to receive full credit (8 pts).



4c) Suppose the reaction in 4b were run using chromic acid (H_2CrO_4), acetone and water. Which of the following is an intermediate in that reaction (circle it)? (5 pts)



5. For each of the following, outline a synthesis of the target compound from the indicated starting material, *reagents of three or fewer carbon atoms*, and any inorganic reagents. For full credit, show the reagents and the product of each step. (23 pts)

