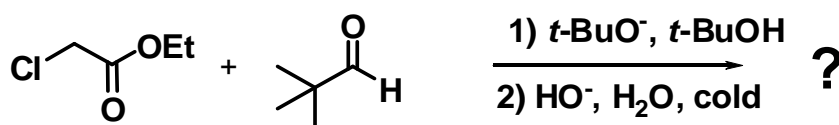


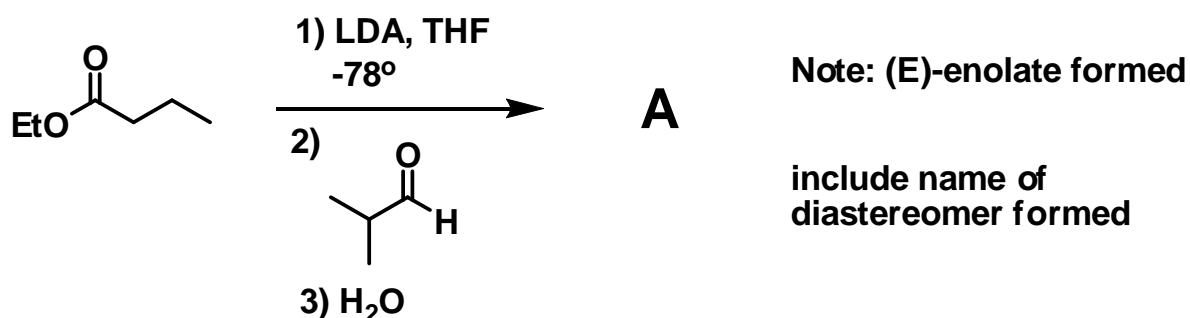
Answer all questions in the test booklet(s) provided. Answers written in pencil will be marked, but cannot be returned for remarking.

1. Give the **complete** mechanism for the following two step Darzens condensation between ethyl chloroacetate and pivaldehyde. Please show **all** steps and **all** intermediates, and all small molecules given off or used during the reaction. Please also indicate which steps are reversible and which are (essentially) irreversible. (10 marks)

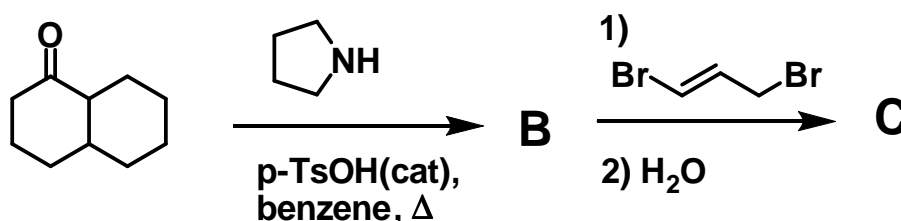


2. Indicate the structure of the expected major product from each of the following reactions. Include stereochemistry where it is relevant. Mechanisms are *not* necessary, but showing your work is likely to be a help. (5 for each letter, 40 marks total)

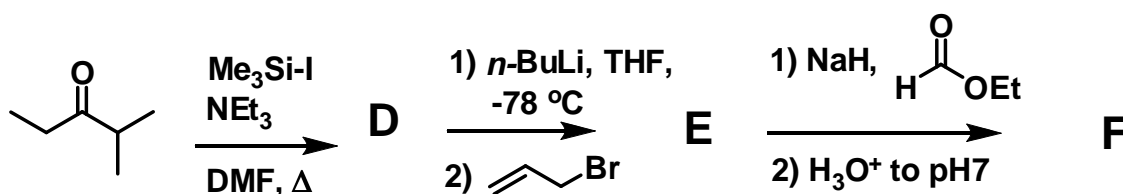
a)



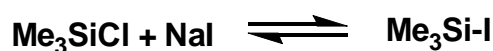
b)



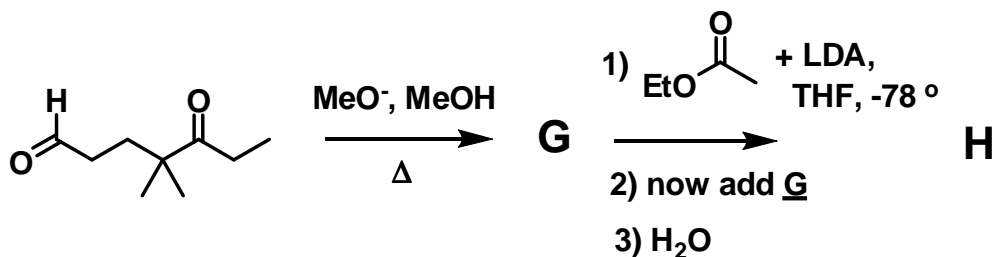
c)



Note: TMS iodide often generated in solution by....

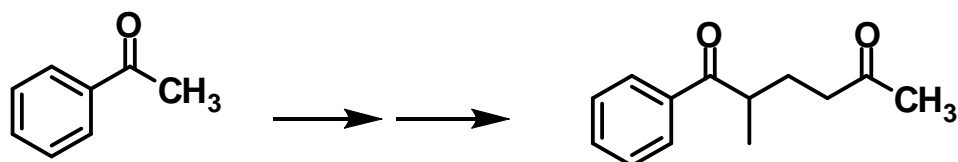


d)

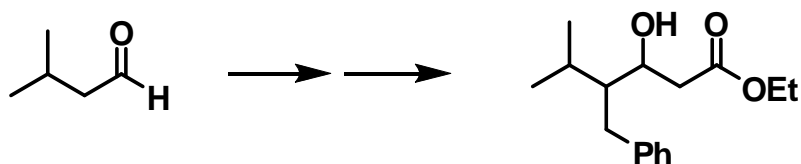


3. Show by equation how you would prepare the products illustrated below from the indicated starting material. You may use *any* other reagents you deem to be fit. Show all reagents, conditions, and *intermediates that could be isolated*. Mechanisms are not necessary, but showing your work may be a help. (10 marks each, 30 total)

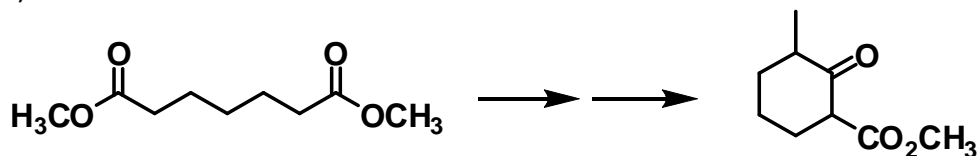
a)



b)



c)



Bonus. As we have discussed in class, generation of stoichiometric amounts of enolates from aldehydes is *very* difficult. As it turns out, there is a specialty method that works well to get the lithium enolate of acetaldehyde (ethanal) only, which is the treatment of THF with *n*-BuLi with very slight warming. Can you propose a mechanism for this, and include the byproducts?

