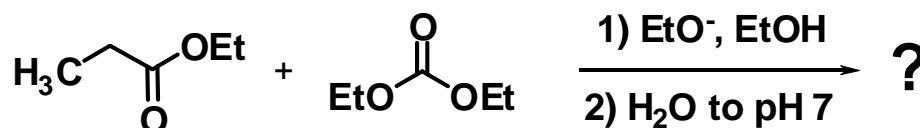


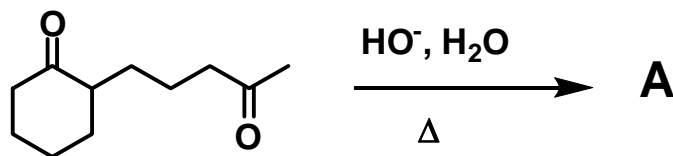
Answer all questions in the test booklet(s) provided. Answers written in pencil will be marked, but cannot be returned for remarking.

1. Give the **complete** mechanism for the base induced Claisen condensation between ethyl propanoate and diethyl carbonate. 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. Note: I added the protonation step just for completeness. (10 marks)

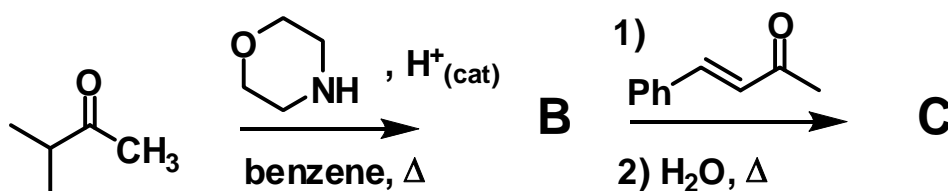


2. Indicate the structure of the expected major product from each of the following reactions. Include stereochemistry where it is relevant. Mechanisms are *not* necessary, but showing your work is likely to be a help. (5 for each letter, 40 marks total)

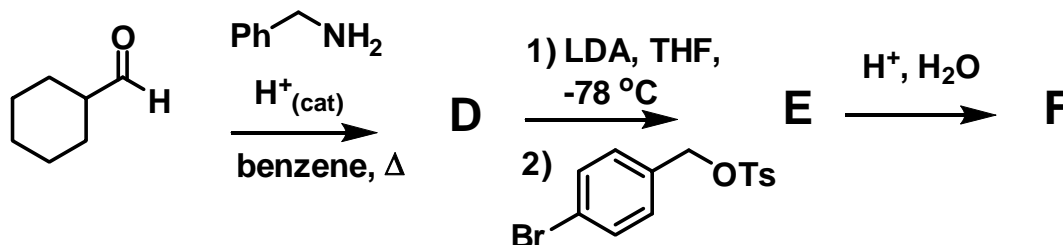
a)



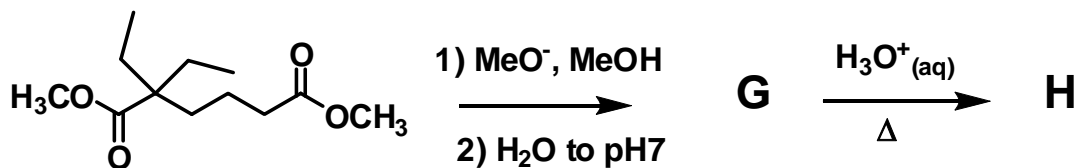
b)



c)

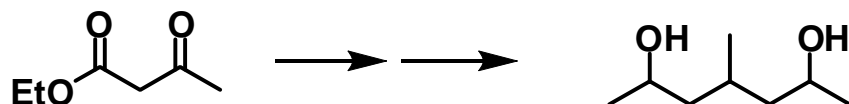


d) on next page

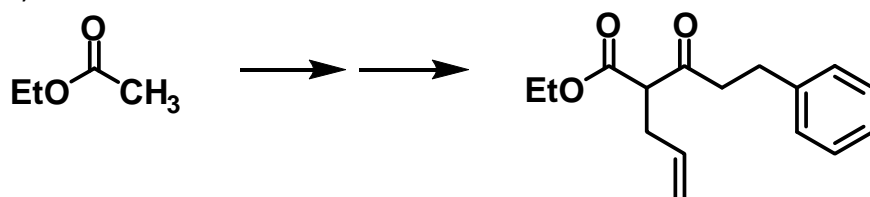


3. Show by equation how you would prepare the products illustrated below from the indicated starting material. You may use *any* other reagents you deem to be fit. Show all reagents, conditions, and *intermediates that could be isolated*. Mechanisms are not necessary, but showing your work may be a help.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

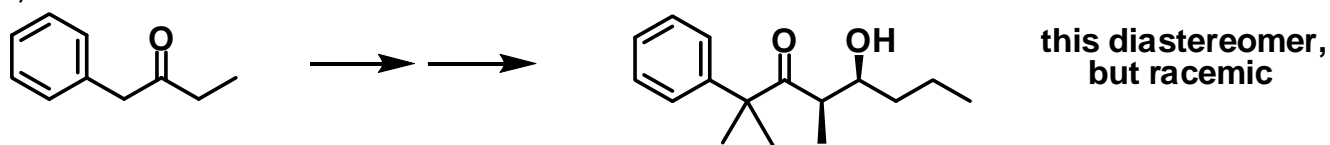
a)



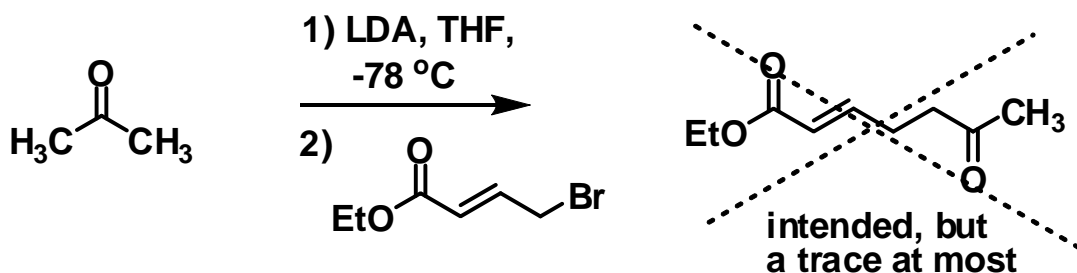
b)



c)



**Bonus.** In an attempt to get access to the difficult class of 1,6-dicarbonyl compounds, Professor Thebtaranonth attempted the indicated logical reaction. Unfortunately, the intended 1,6-dicarbonyl was not obtained, but a compound including a cyclopropane ring. What was formed and how?



Note: Ts =

