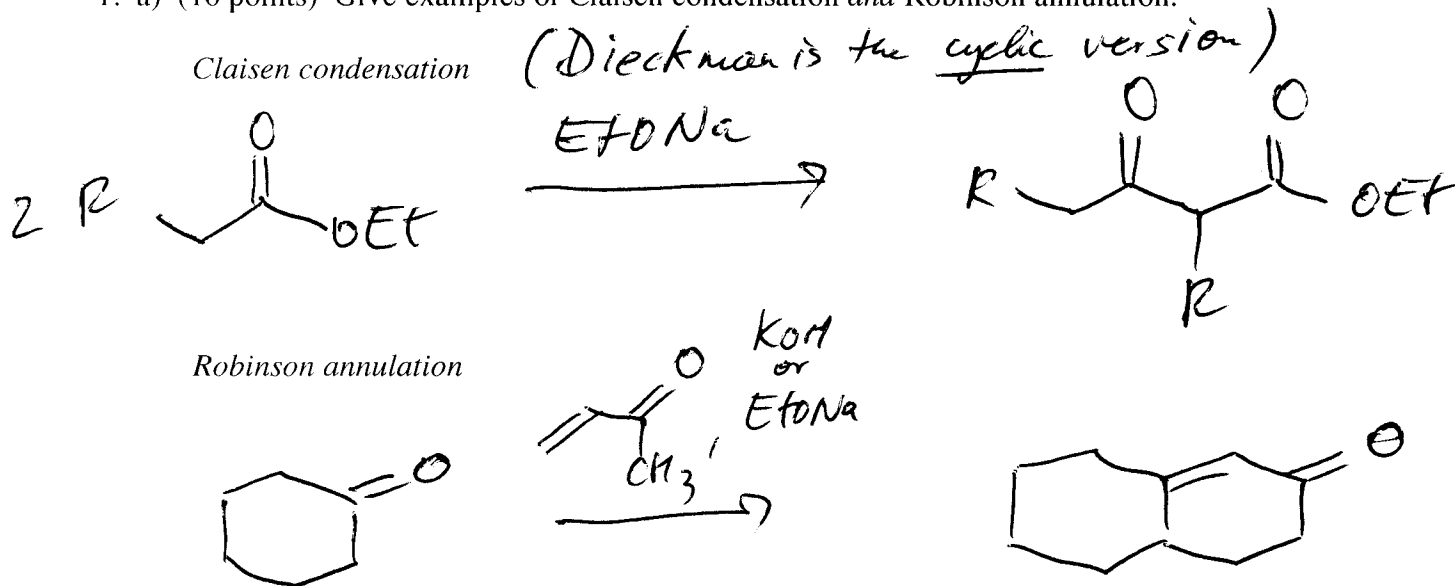
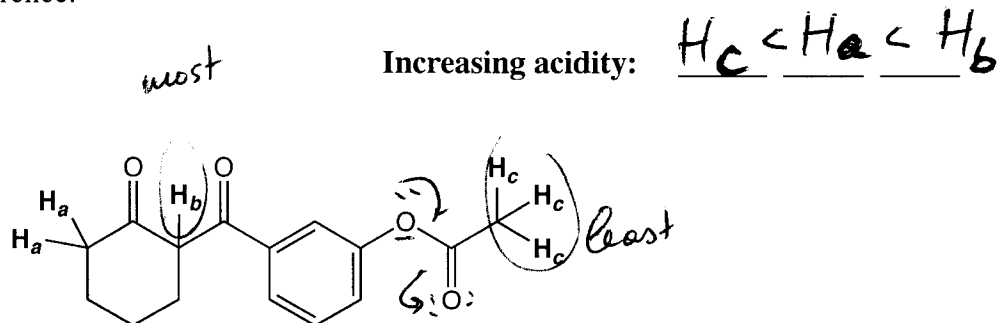


I. CONCEPTS AND THEORY

1. a) (10 points) Give examples of Claisen condensation and Robinson annulation:

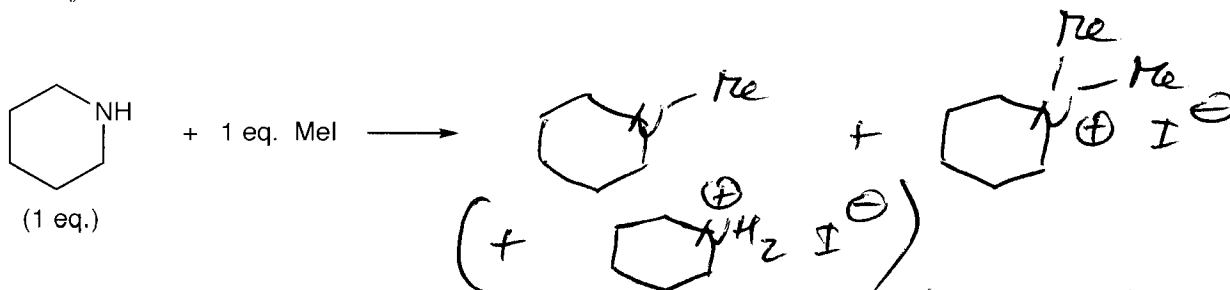


b) (10 points) Rank the hydrogens shown in **bold** in the following compound by increasing acidity and explain the origin of this difference:



H_b activated by two α -carbonyl groups \Rightarrow resonance stabilize of anion
 H_c less well resonance stabilized b/c ester is also delocalized

c) (5 points) What is (or are) the product (or products) for the following reaction and explain the outcome in a few words:

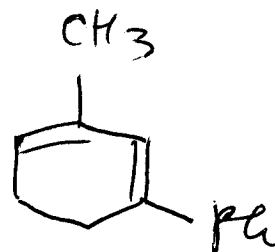
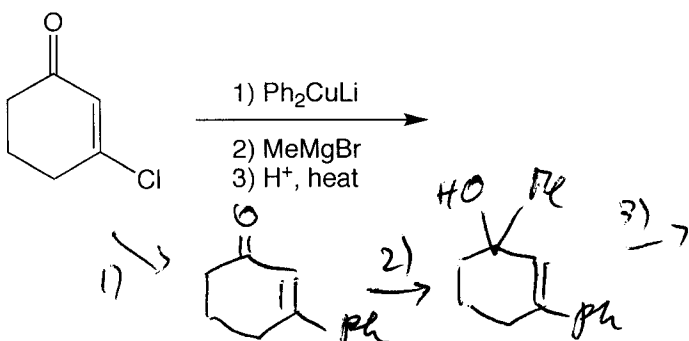


amines get more and more reactive with increasing alkylation \Rightarrow mixture of products

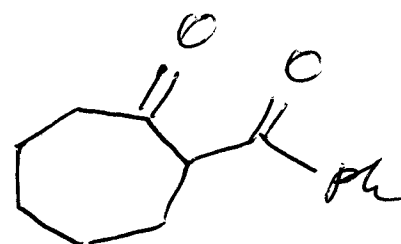
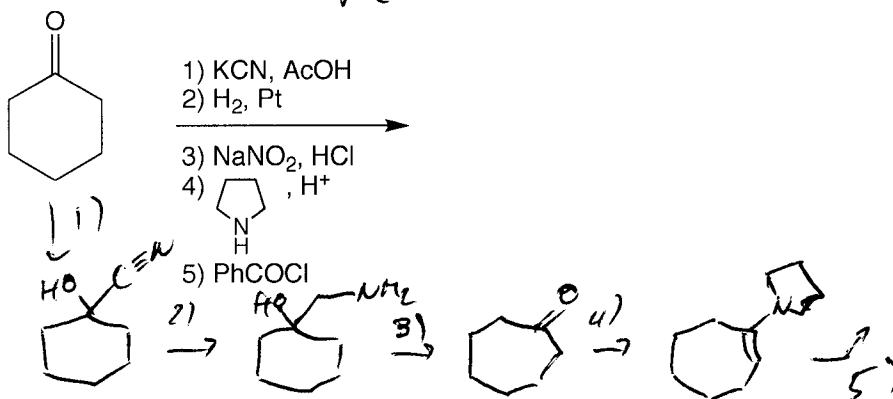
II. REACTIONS

2. (25 points) Give the product for the following reactions, assuming 1 equivalent of reagent is used unless specified otherwise (show each step, where applicable, to ensure max. credit if you are not sure of your final product):

a)

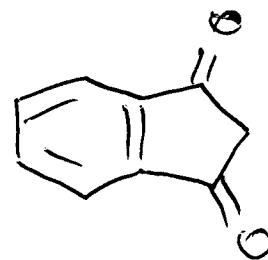
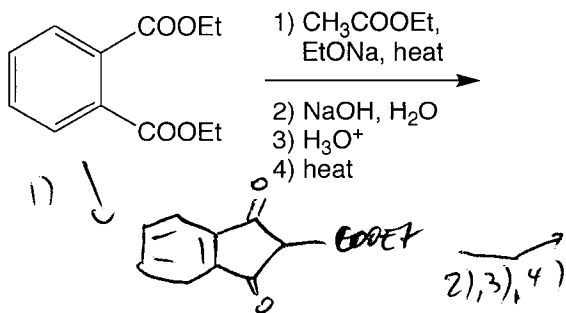


b)

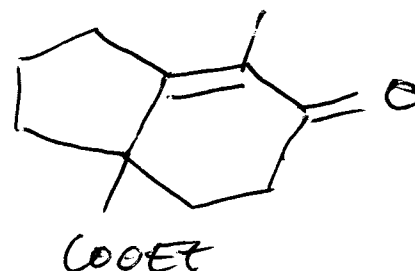
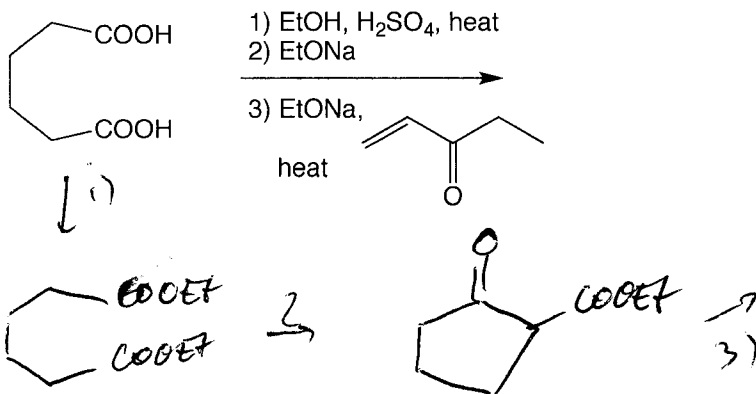


(7-membered ring)

c)



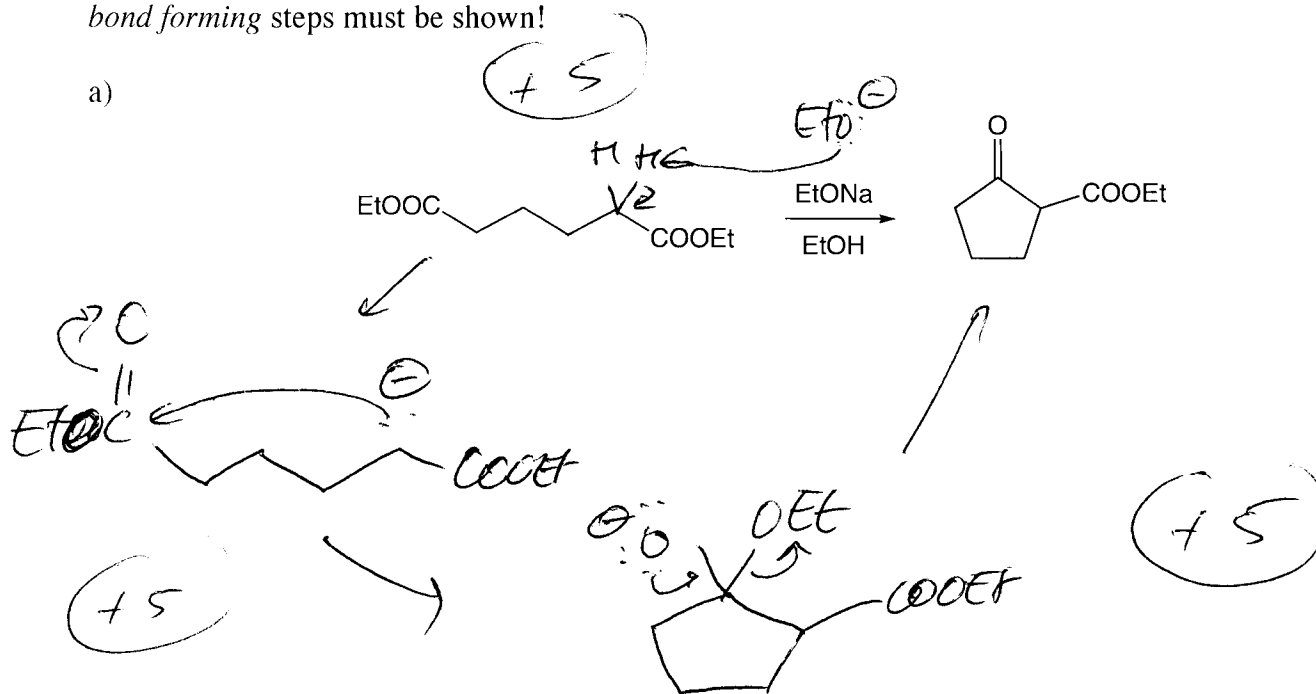
d)



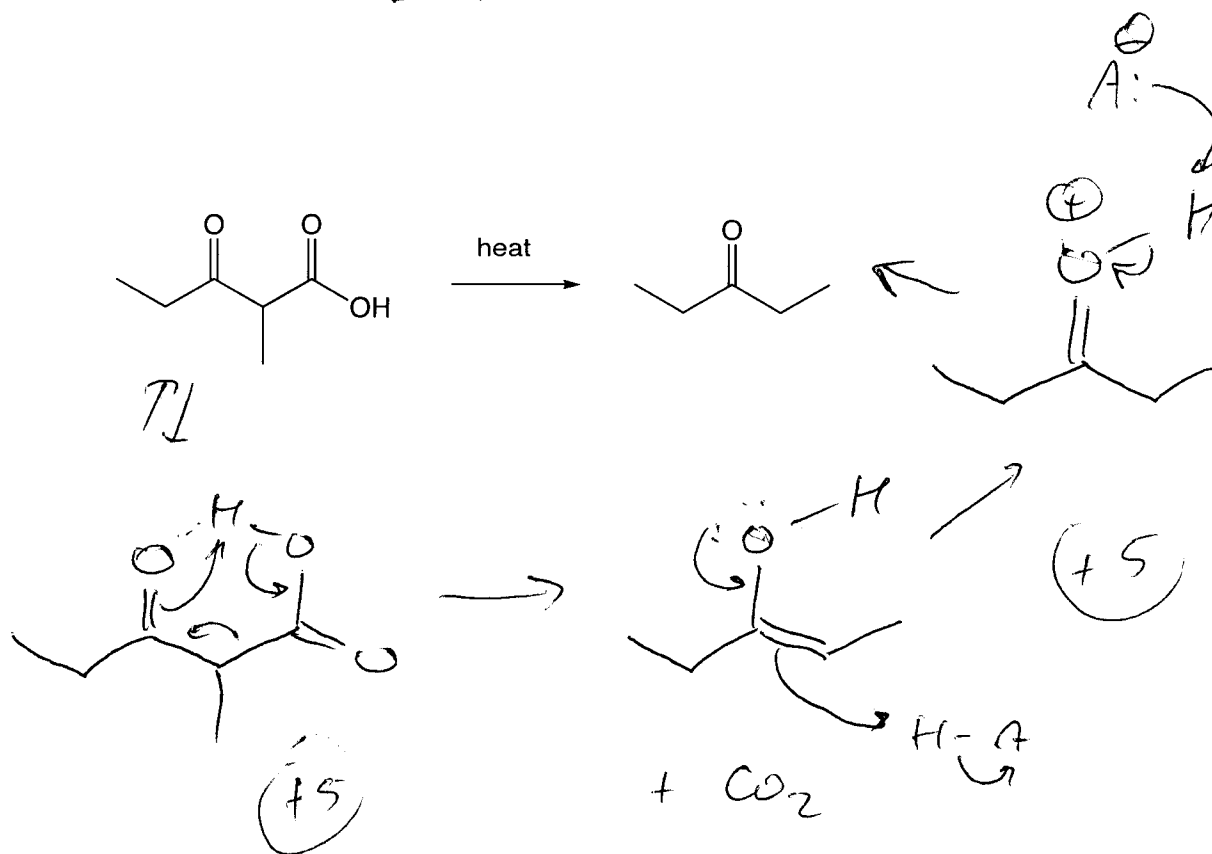
III. MECHANISMS

3. (25 points) Provide a complete, detailed mechanism with curved arrow formalism for the following reactions. **Each step must be explicitly written down**, i.e. every attack of reagent, bond breaking and bond forming steps must be shown!

a)



b)

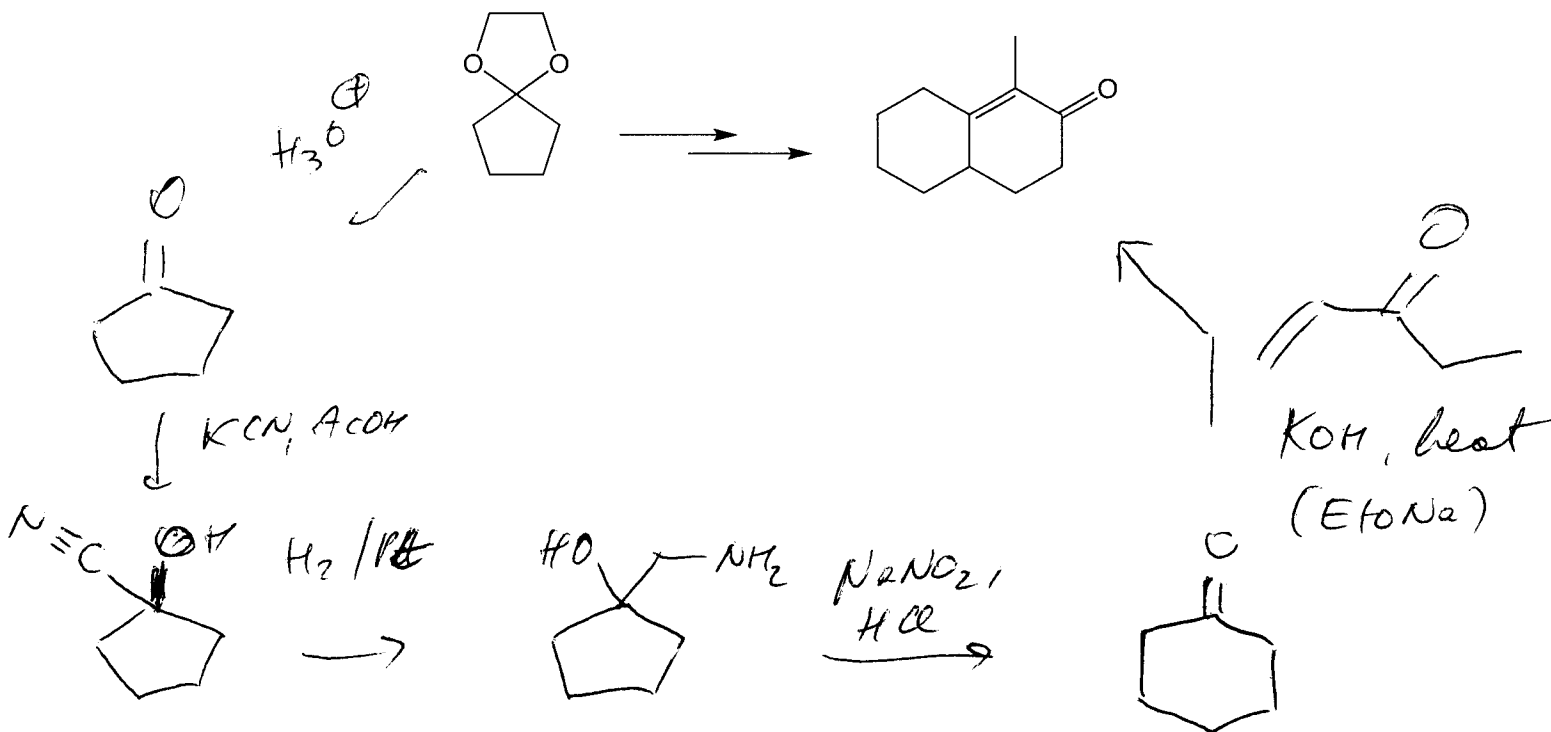


IV. TRANSFORM

4. (25 points) Devise a reasonable synthesis for each of the following compounds from reagents you are familiar with and the starting materials provided:

Note: do no "invent" new reagents or reactions. Use only those specifically taught in class or previous quarter's reactions. There should not be more than 10 steps necessary in these syntheses, although longer ones may also be correct.

a) (15 points)



b) (10 points)

