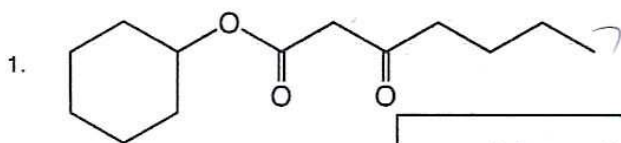
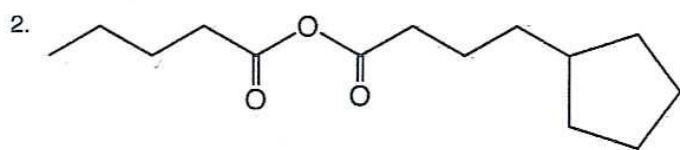


A. Nomenclature: (16 points)

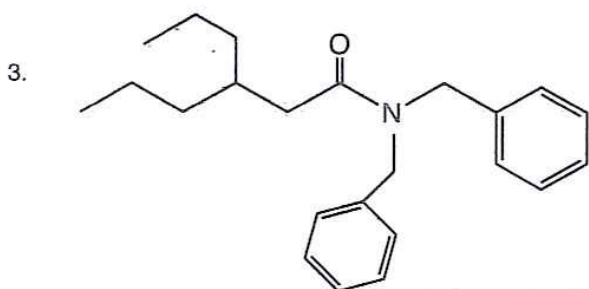
Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the stereochemistry where appropriate.



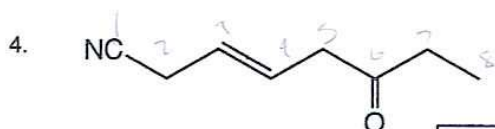
cyclohexyl 3-oxoheptanoate



4-cyclopentylbutanoic pentanoic anhydride



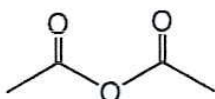
N,N-dibenzyl-3-propylhexanamide



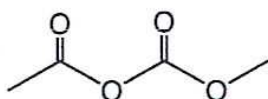
(3E)-6-oxo-3-octenitrile

B. Facts: 12 points (3 points each)

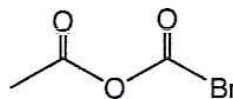
1. Rank the following compounds in order of increasing rate of nucleophilic acyl substitution. (1 = slowest rate, 3 = fastest rate)



2



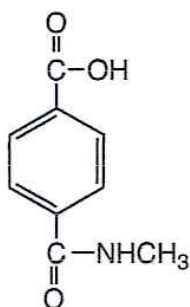
1



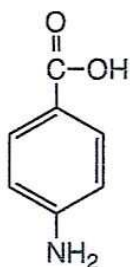
3

+3

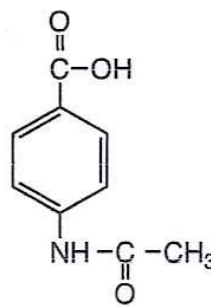
2. Rank the following compounds in order of increasing acidity. (1=least acidic, 3=most acidic)



3



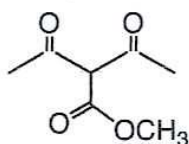
1



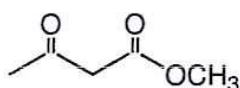
2

+3

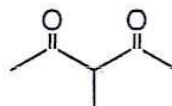
3. Rank the following compounds in order of increasing acidity. (1=least acidic, 3=most acidic)



3



1



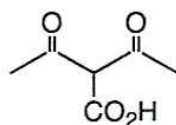
2

+3

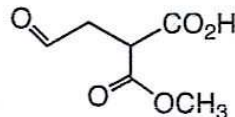
4. Consider the decarboxylation at 180°C of the following compounds. If decarboxylation is possible, place Y (for yes) in the box. If decarboxylation is not possible, place N (for no) in the box.



N



Y

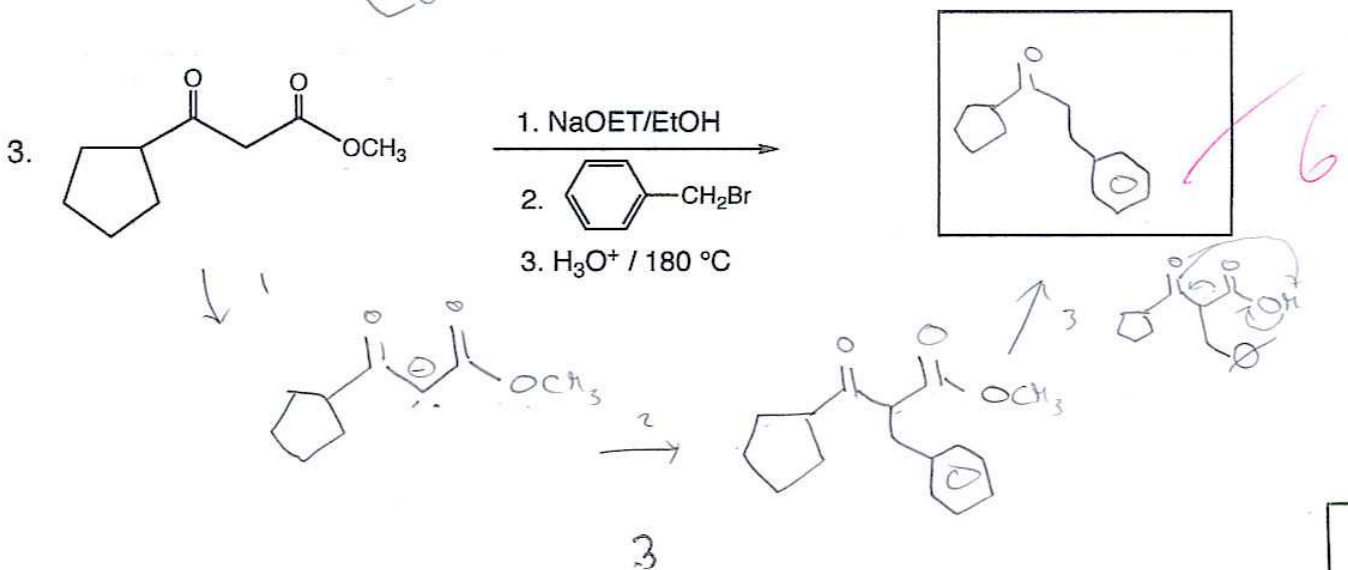
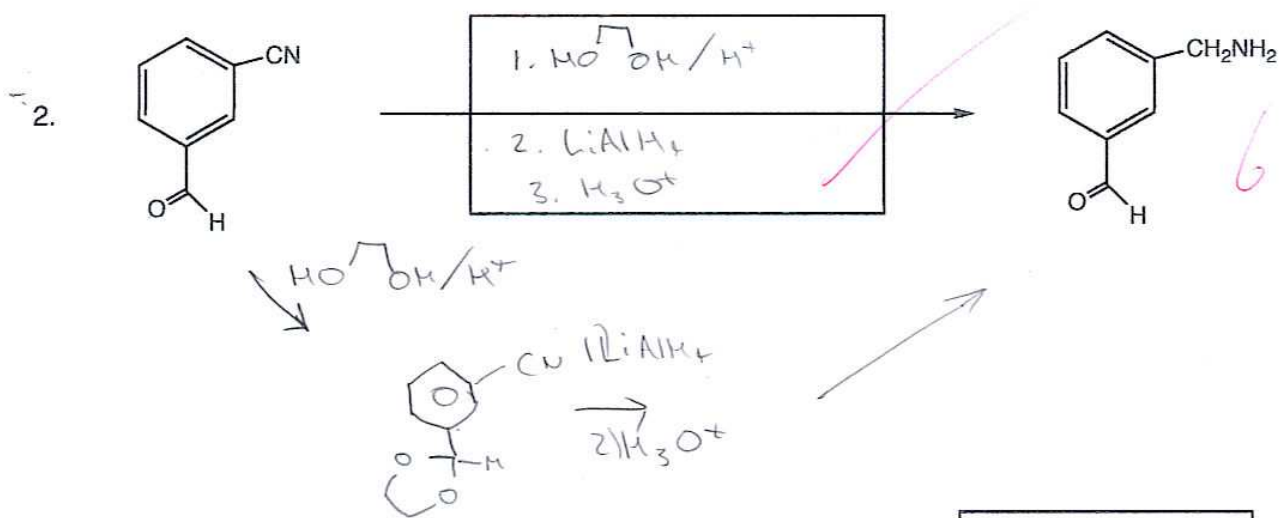
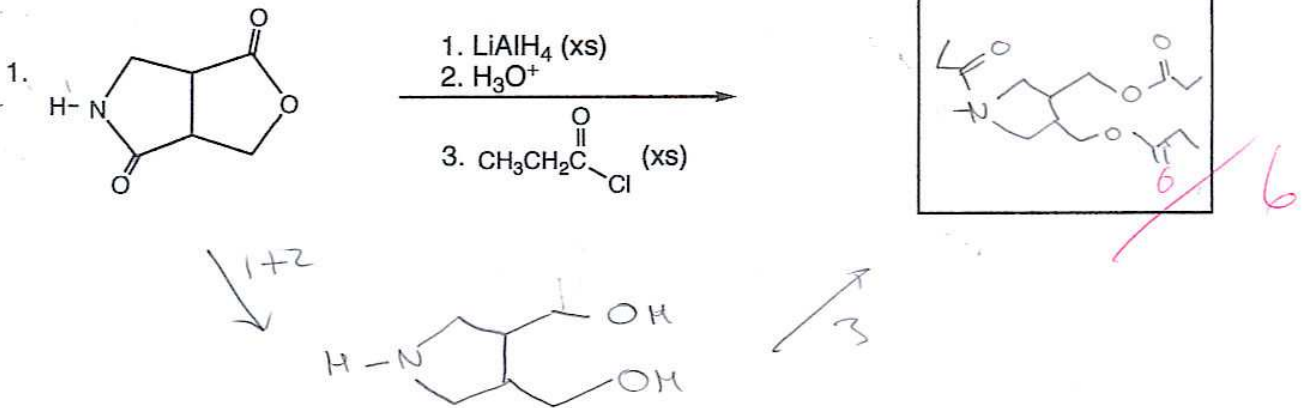


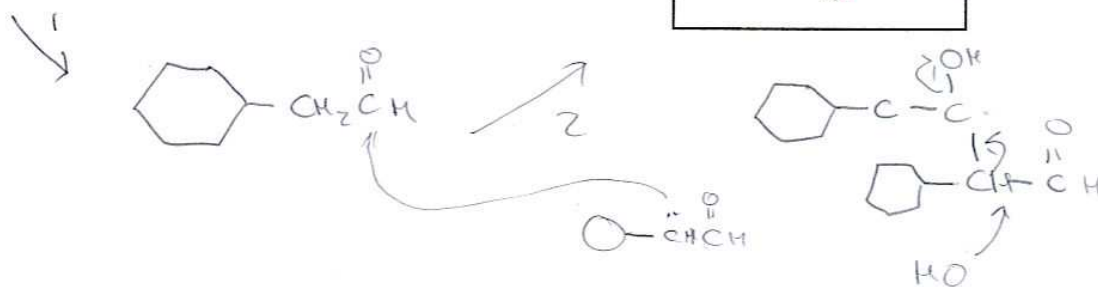
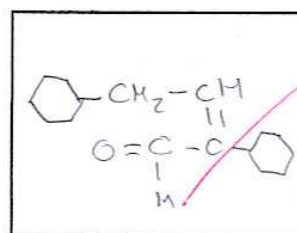
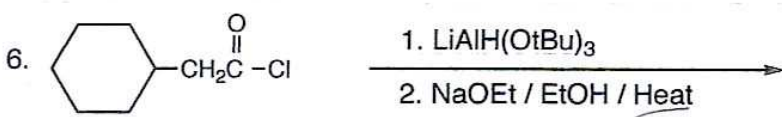
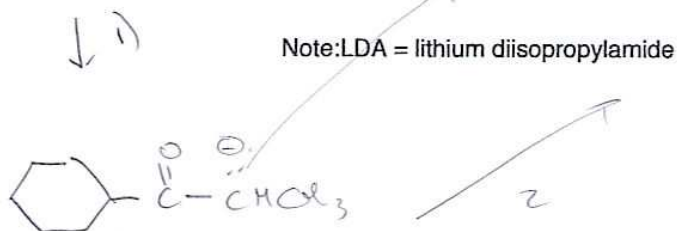
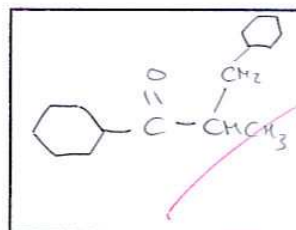
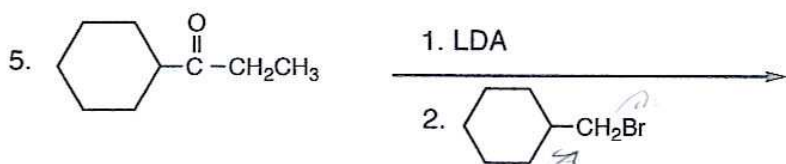
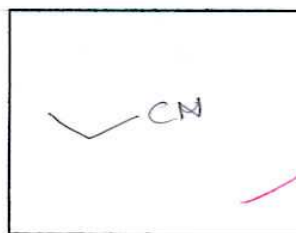
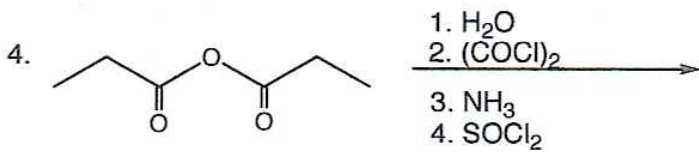
Y

+3

C. Reactions: Total = 36 points, 6 points each

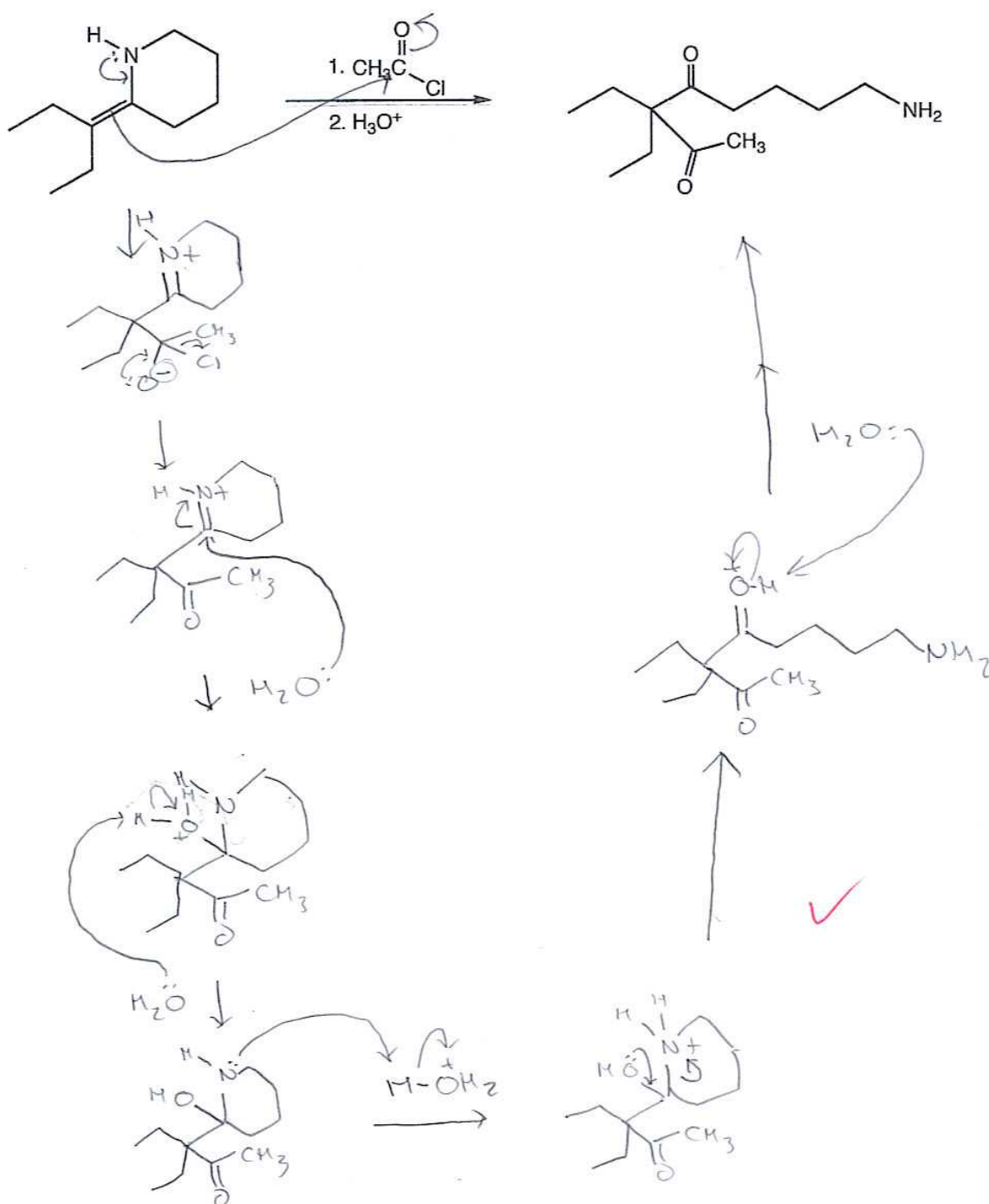
Please provide the reagents or major product in the answer box. Be sure your drawing indicates **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.





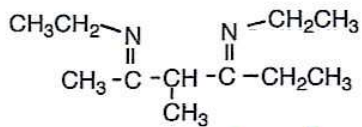
D. Mechanism: (12 points)

Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. Show all intermediates and all formal charges. When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.

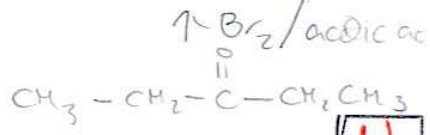
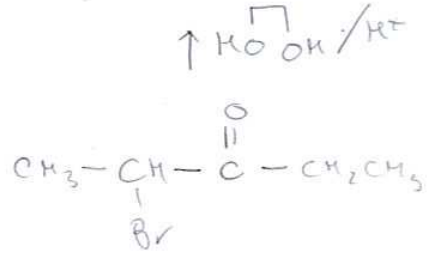
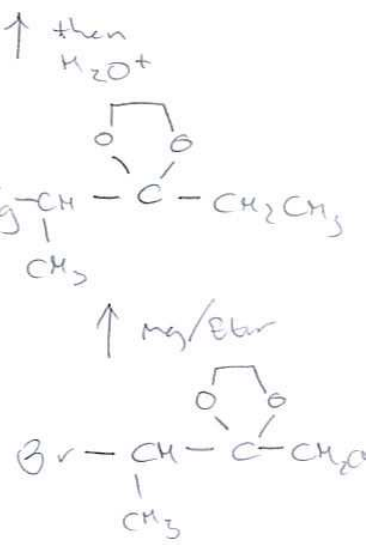
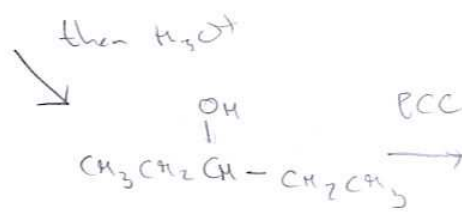
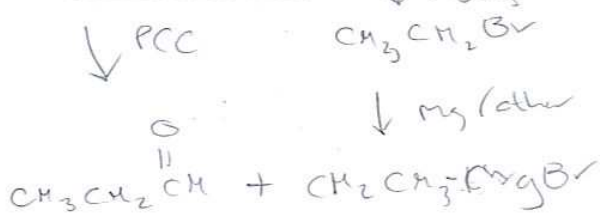
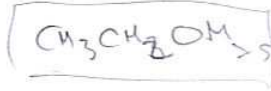
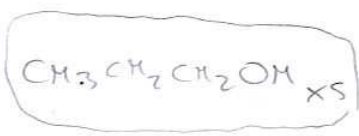
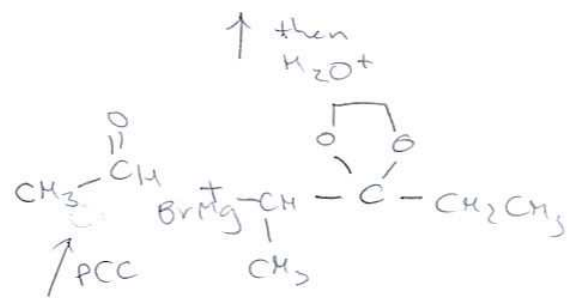
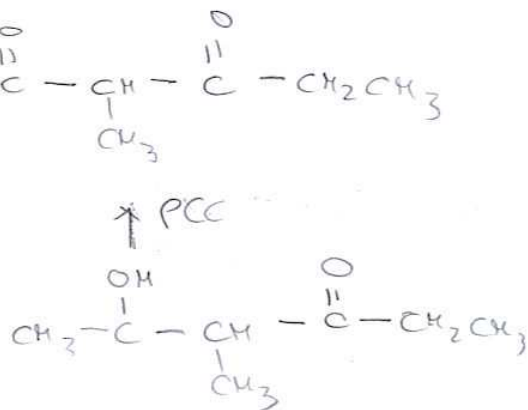
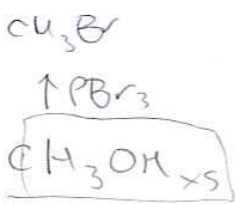
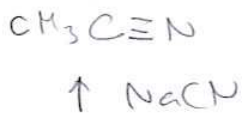
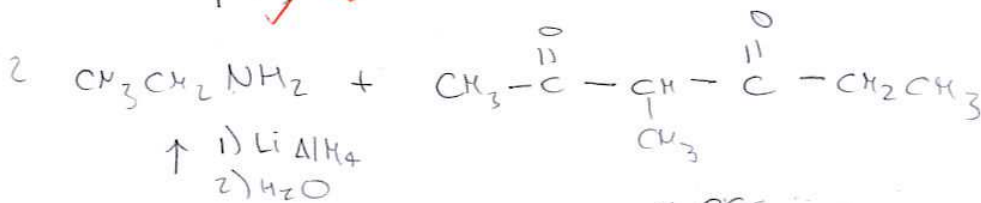


E. Synthesis: 12 Points

Synthesize the molecule below using any of the following reagents: any alkanes, alkenes, or alcohols of **three carbons** or less, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



converts imine back to C=O (circled -1)

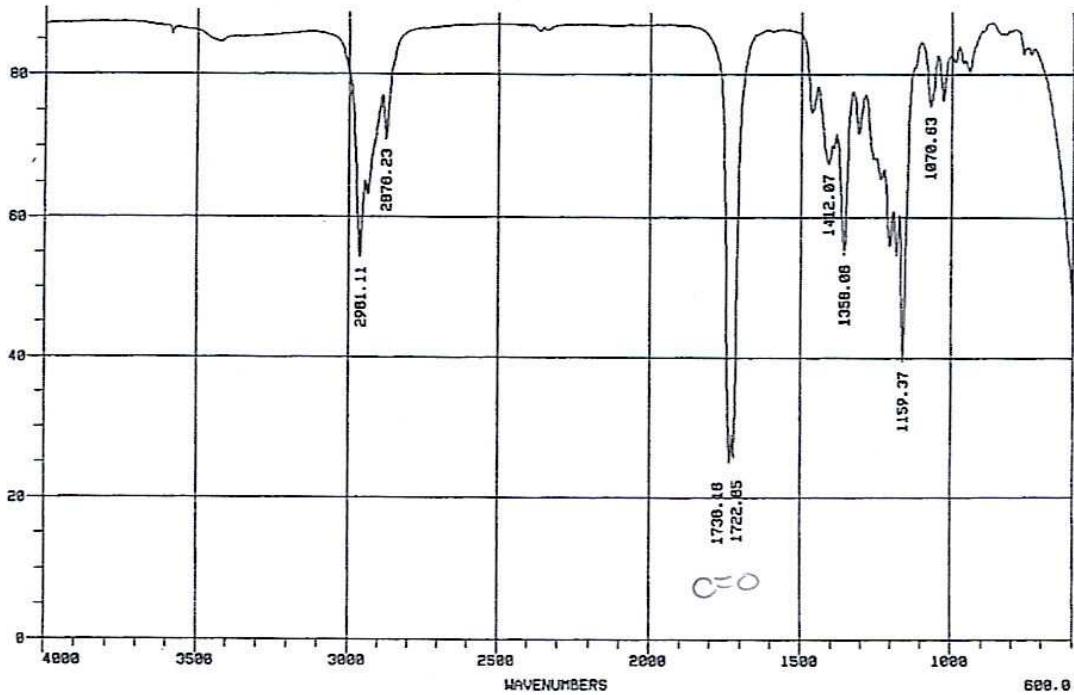


11

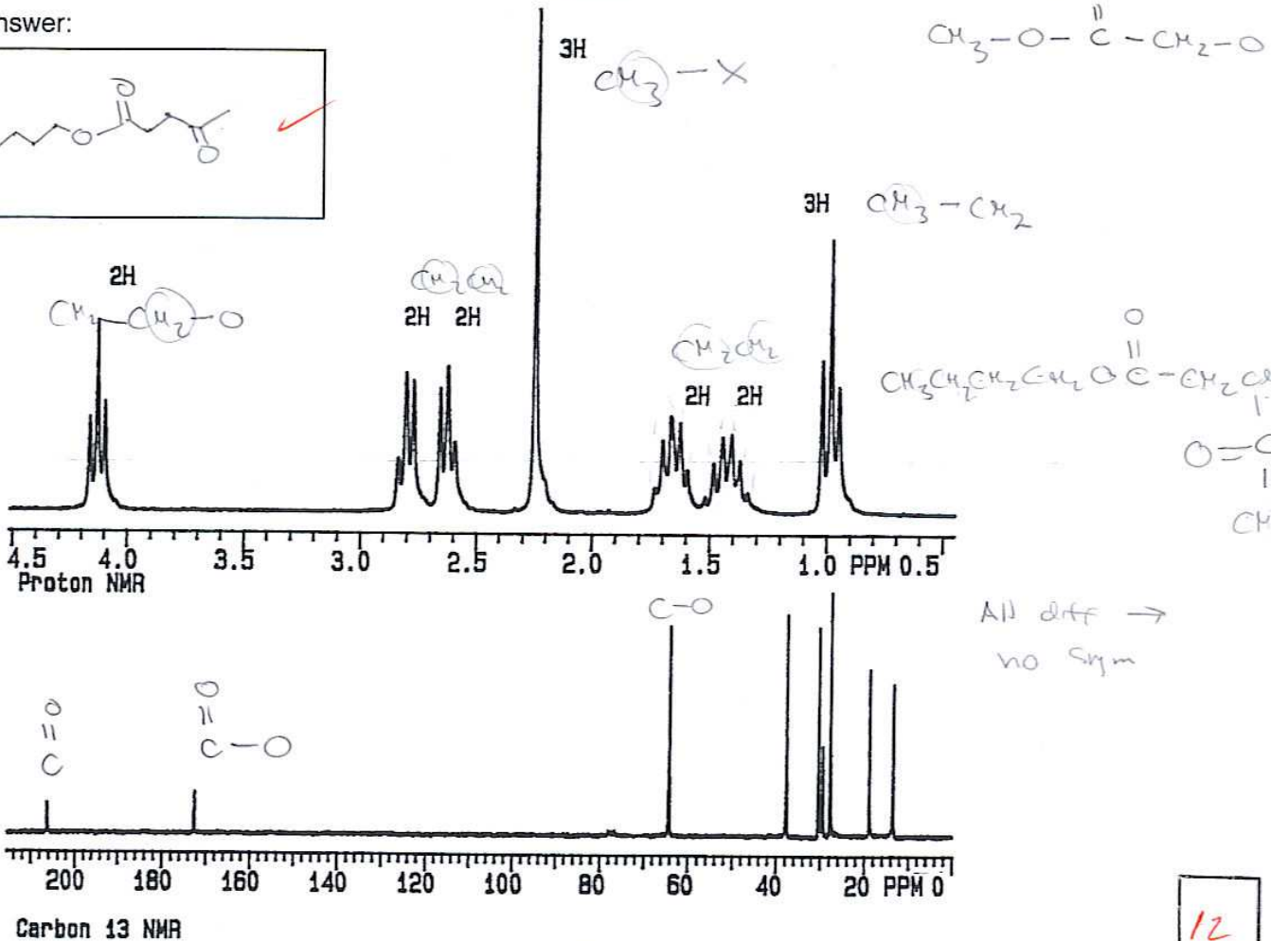
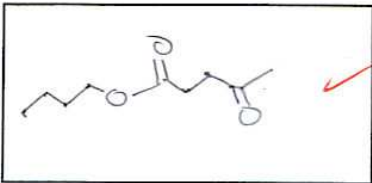
E. Spectroscopy: 11 Points

A compound with the formula $C_9H_{16}O_3$ exhibits the IR, 1H NMR and proton decoupled ^{13}C NMR spectra shown below. Please identify this compound and draw the structure in the box provided below.

$$\frac{2(9) + 2 - 16}{2} = 2 \quad \text{--- No OH}$$



answer:



12