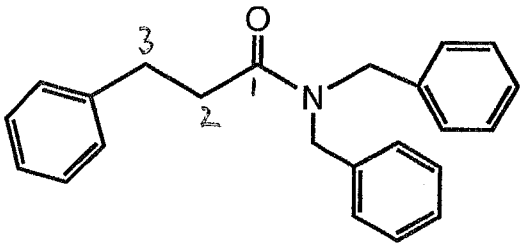
Final Exam Sp 2025

A. Nomenclature: (15 points)
Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the **stereochemistry** where appropriate.

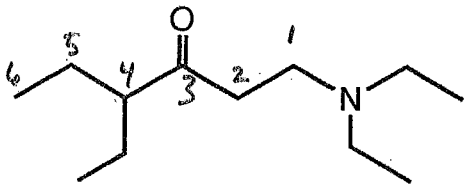
(-1) for incorrect numbering

1. 

N,N-dibenzyl-3-phenylpropanamide

2pts 1pt 2pts

(-1) if no N,N

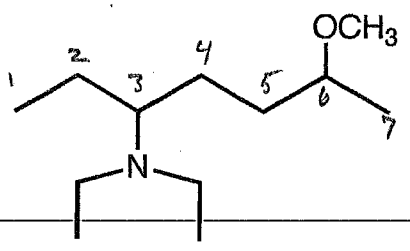
2. 

if use N,N (-1)

OR

4-ethyl-1-diethylamino-(3)-hexanone

1pt 2pts 2pts

3. 

OR

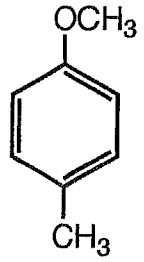
N,N-diethyl-6-methoxy-(3)-heptanamine

2pts 1pt 2pts

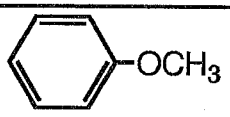
(-1) if no N,N

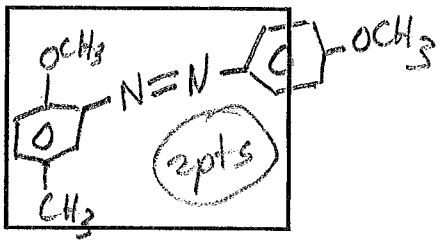
B. Reactions: Total = 40 points (8 points each)
Please provide the major product in the answer box unless indicated otherwise. Indicate **stereochemistry** if applicable. **Full credit is awarded only when the product of each step in a multi-step reaction is shown below the reaction.**

1.



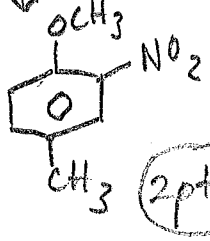
1. HNO_3/H_2SO_4
2. H_2 / Pt
3. $NaNO_2$ /HCl
4.





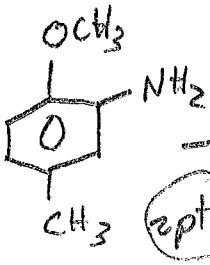
(-1) if ortho to CH_3

1)



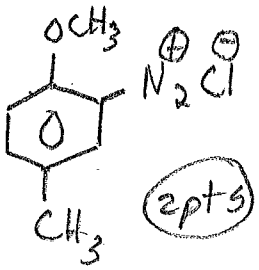
2pts

2)



2pts

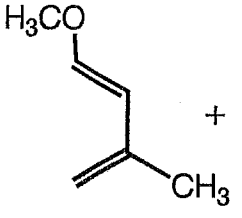
3)



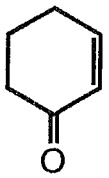
2pts

4)

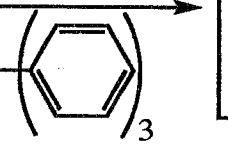
2.

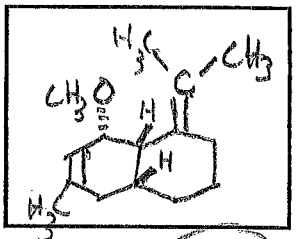


+



1. Heat
2.

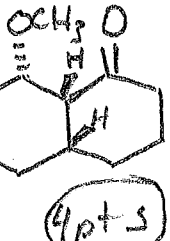




4pts

(-1) stereo
(-1) regio

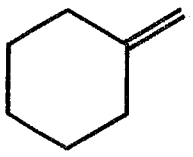
1)



4pts

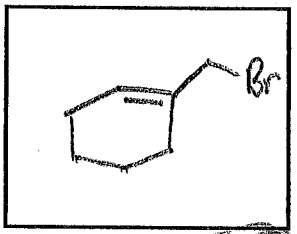
2)

3.



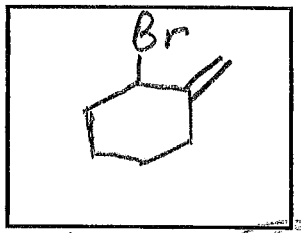
NBS/65°C

more stable double bond is major



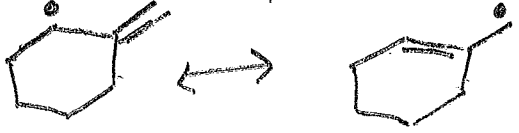
Major

4pts



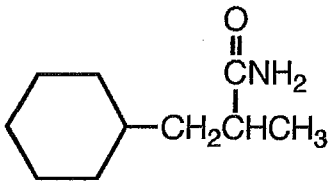
Minor

4pts

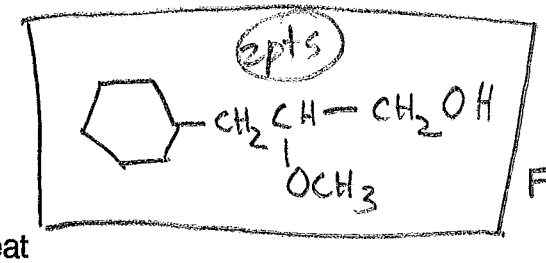


(-3) total if reversed

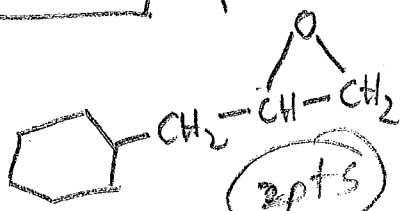
4.



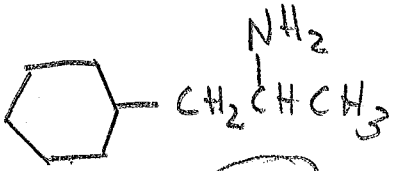
1. Br_2 /NaOH/Heat
2. CH_3I (xs) then AgO_2/H_2O/Heat
3. MCPBA
4. CH_3OH / H^+



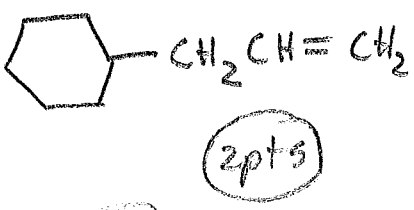
4)



1)



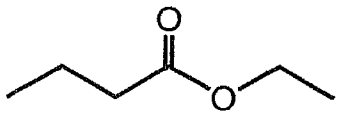
2)



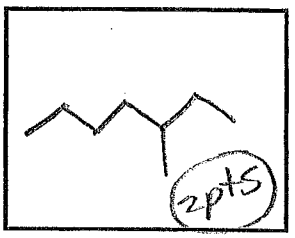
3)

(-1) if more substituted

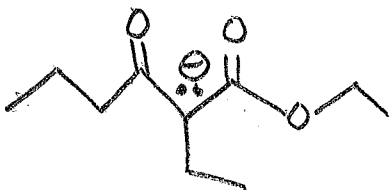
5.



1. NaOEt / EtOH
2. CH_3Br
3. H_3O^+ / 180°C
4. NH_2NH_2 / KOH/ Heat



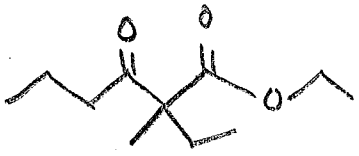
1)



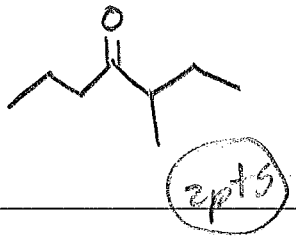
Must be enolate anion

4

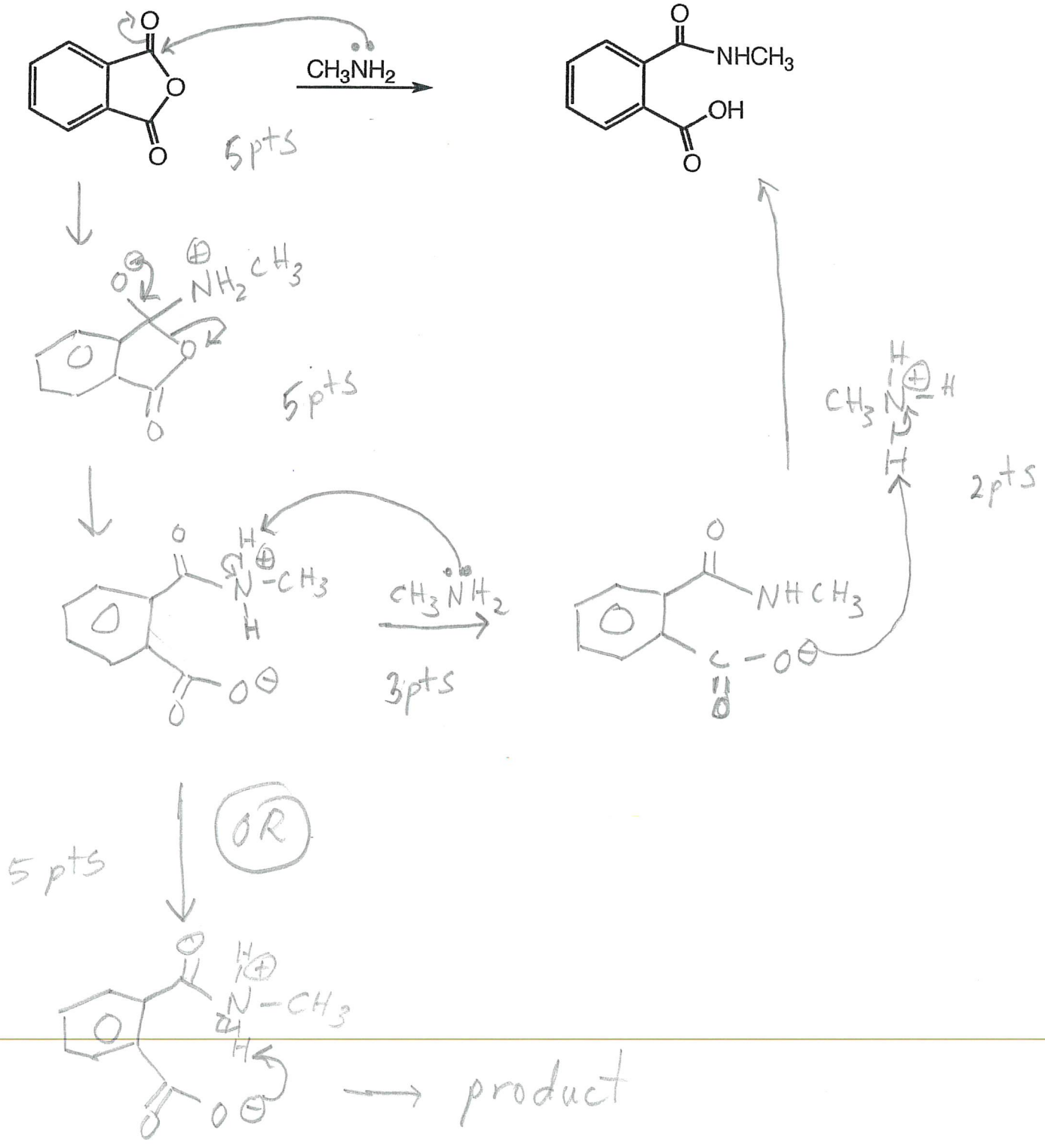
2)



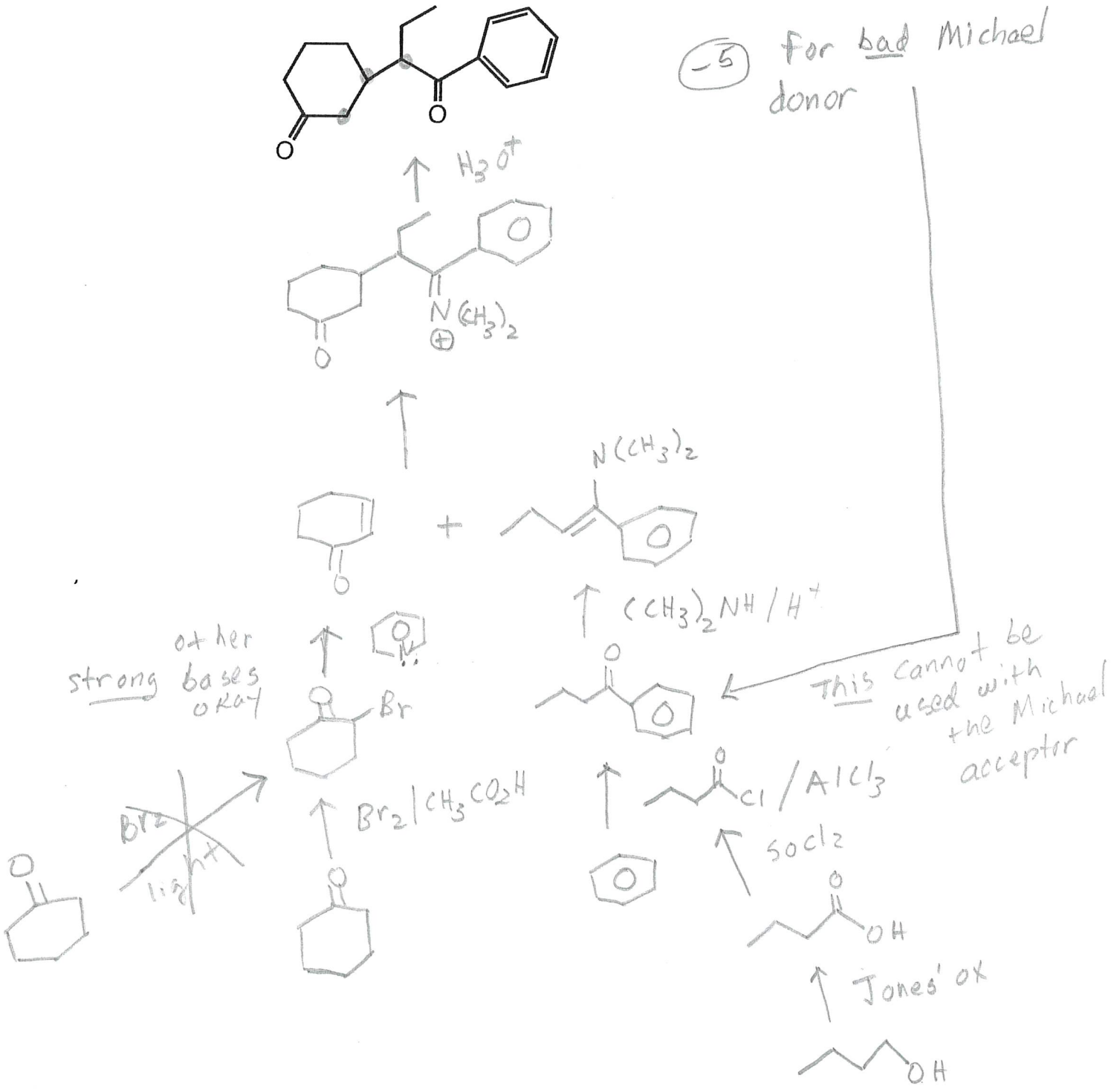
3)



C. Mechanism: (15 points)
Provide a clear mechanism to explain the formation of the product shown. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. **Show all intermediates and all formal charges**. If more than one resonance contributor may be drawn, **be sure to draw the most stable one.** Please do not show transition states.



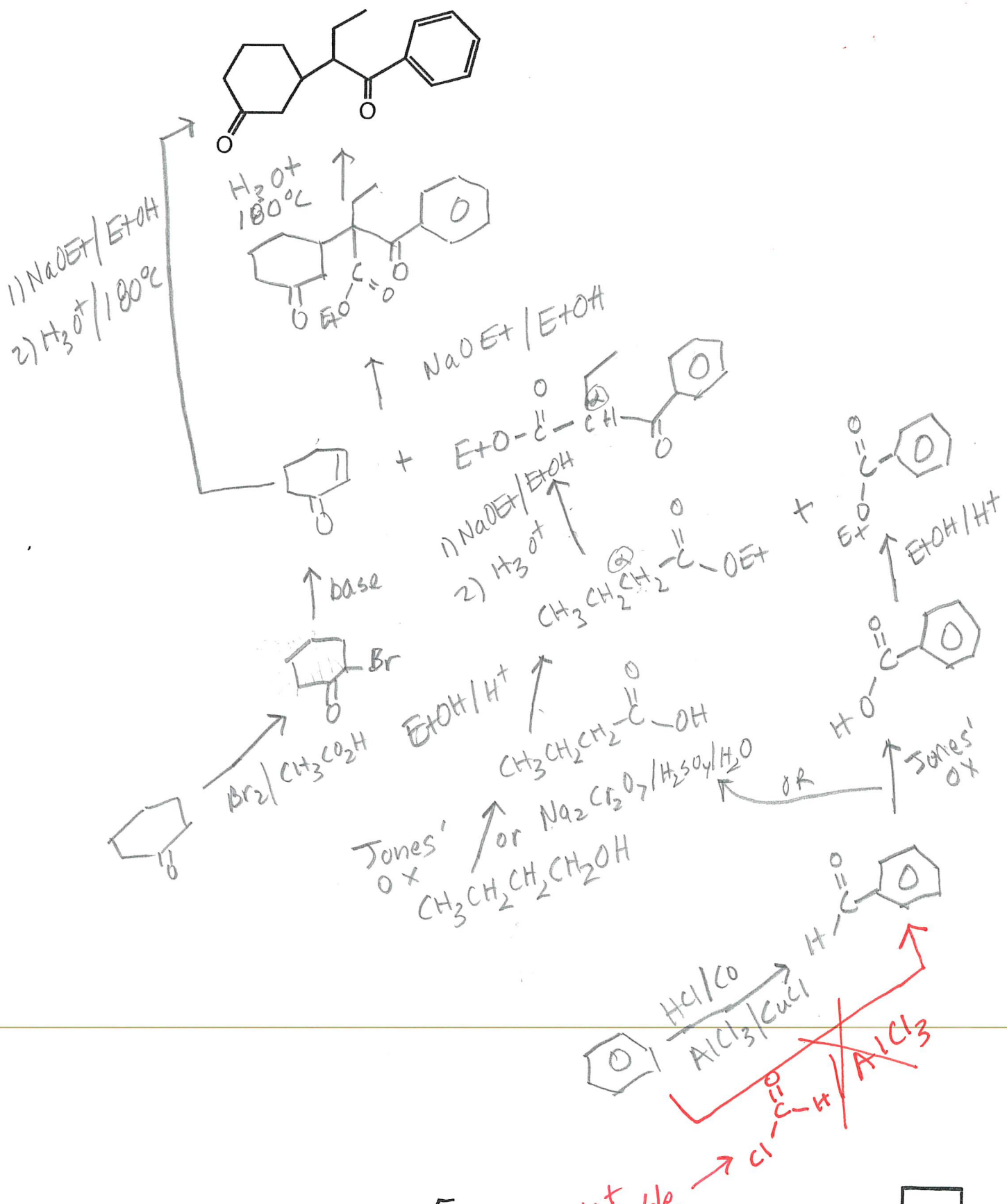
D. Synthesis: 15 Points
Synthesize the molecule below using any of the following reagents: **benzene**, **cyclohexanone**, **alcohols of four carbons or less**, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



alternate answer

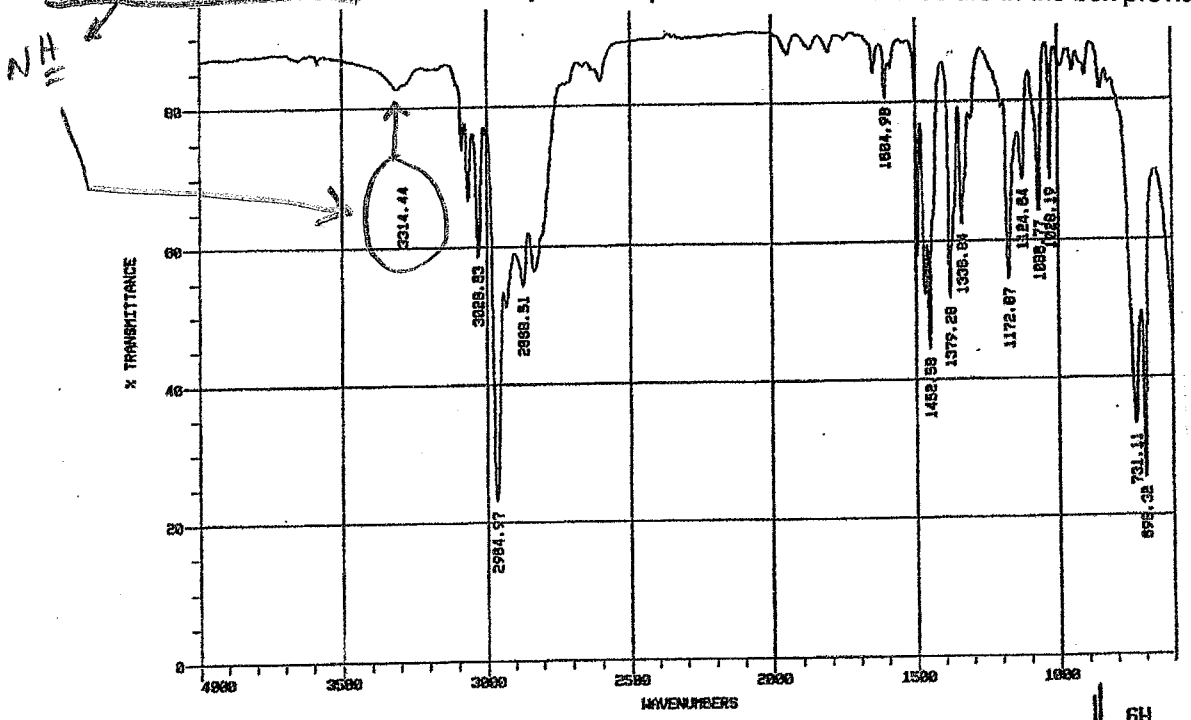
D. Synthesis: 15 Points

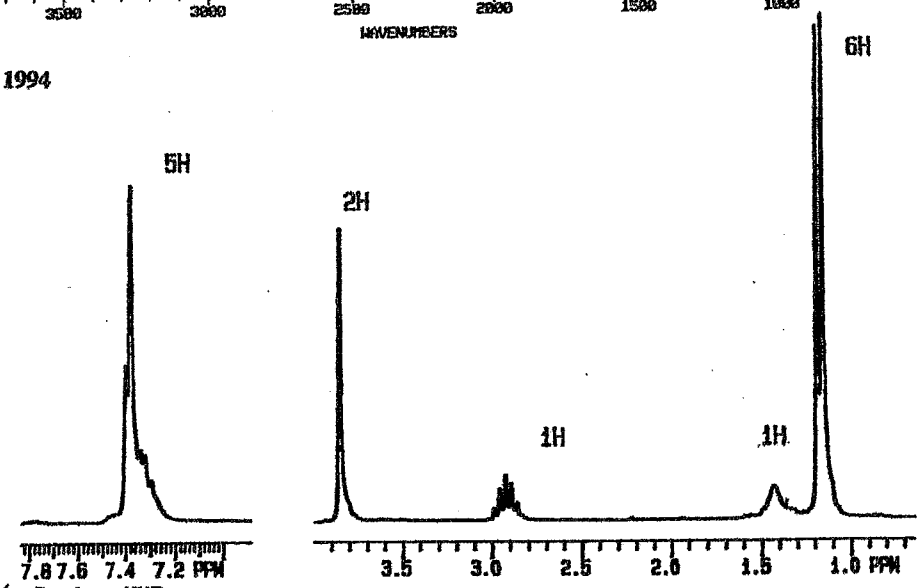
Synthesize the molecule below using any of the following reagents: **benzene**, **cyclohexanone**, **alcohols of four carbons or less**, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



E. Spectroscopy: 15 Points

A compound with the formula $C_{10}H_{15}N$ exhibits the IR, ^1H NMR, and ^{13}C NMR spectra shown below. The peak at 1.45 ppm is D_2O exchangeable. Please identify this compound and draw the structure in the box provided below.





partial credit:
- 2° amine → 3pts
- Other amine → 2pts
- mono (o) → 3pts, other subst ↓ 1pt
- isolated CH_3 → 3pts
- CH_3 adj to only 1 H → 2pts
- CH adj. to many H's → 2pts