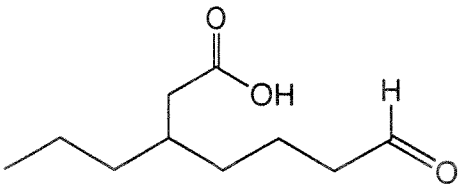
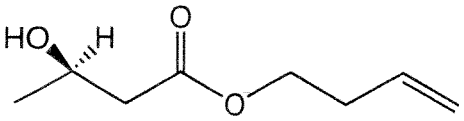
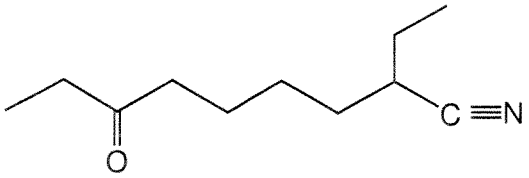
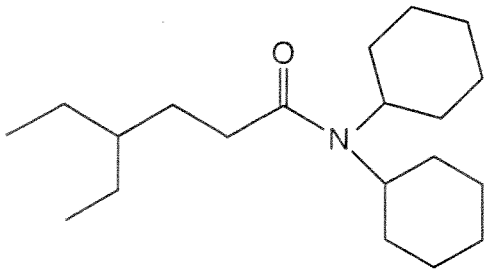
AH EXAM 3, Sp

A. Nomenclature: (16 points)
Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the **stereochemistry** where appropriate.

1. 

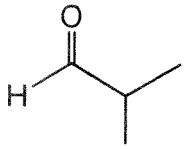
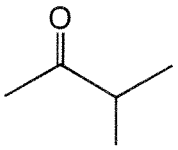
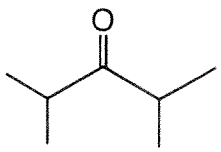
2. 

3. 

4. 

B. Facts: 12 points (3 points each)

1. Rank the following compounds in order of increasing rate of reactivity with ethanol. (1 = slowest rate, 3 = fastest rate)

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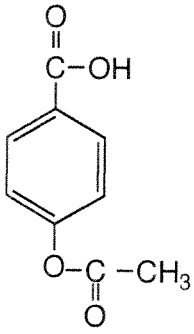
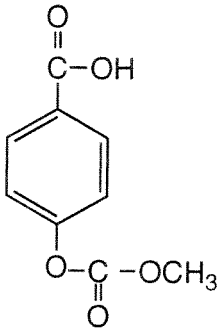
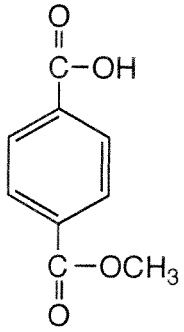
2. Rank the following compounds in order of increasing acidity. (1=least acidic, 3=most acidic)

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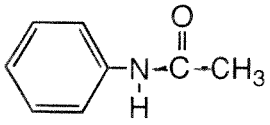
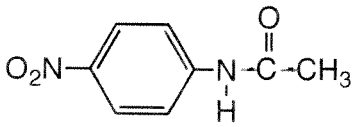
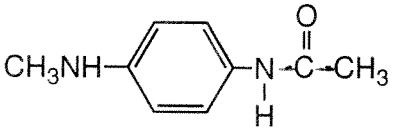
3. 1. Rank the following compounds in order of increasing rate of nucleophilic acyl substitution. (1 = slowest rate, 3 = fastest rate)

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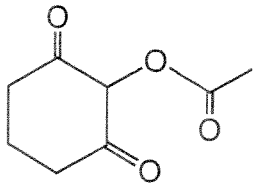
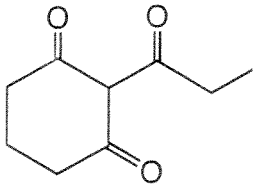
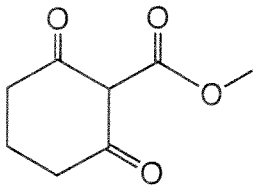
4. Rank the following compounds in order of increasing acidity. (1=least acidic, 3=most acidic)

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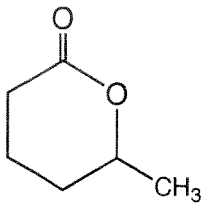
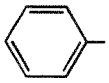
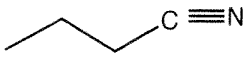
C. Reactions: Total = 36 points, 6 points each
Please provide the reagents or major product in the answer box. Be sure your drawing indicates **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.

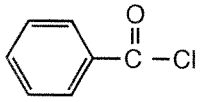
1.



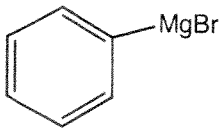
1. $LiAlH_4$ then H_3O^+
2. PCC / CH_2Cl_2
3. $HOCH_2CH_2OH / H^+$
4.  then H_3O^+

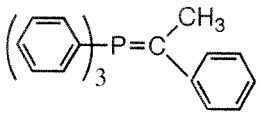
2.

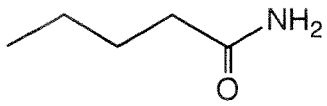


1. $LiAlH_4$ then H_3O^+
2. 

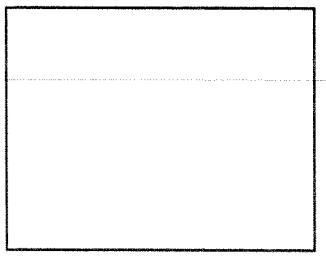
3.

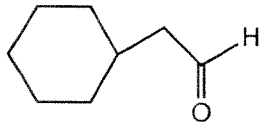


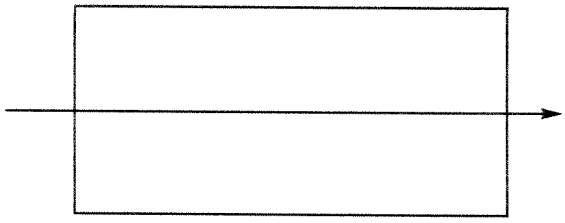
1. CO_2 then H_3O^+
2. $SOCl_2$
3. $(CH_3CH_2)_2CuLi$
4. 

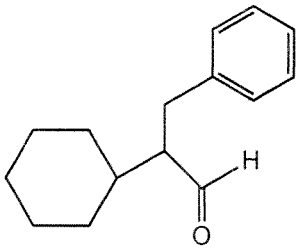
4. 

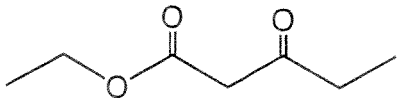
1. $SOCl_2$ or $POCl_3$
2. H_3O^+ / 200°C
3. CH_2N_2

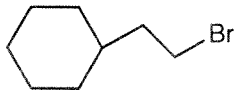


5. 

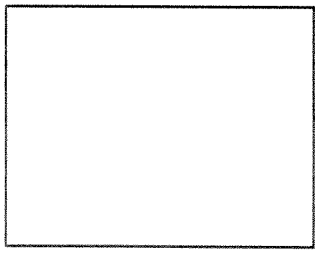




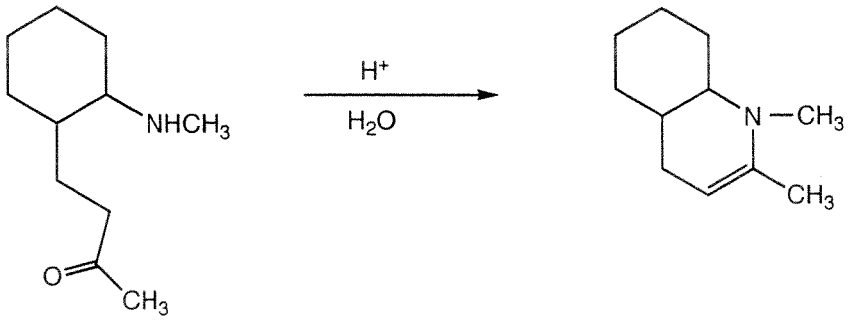
6. 

1. NaOEt / EtOH
2. 

3. H_3O^+/180 °C

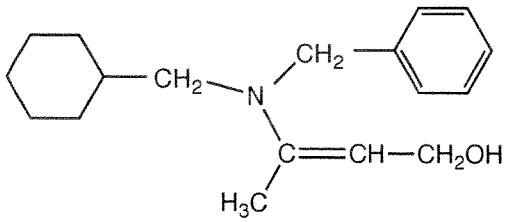


D. Mechanism: (12 points)
Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. **Show all intermediates and all formal charges. When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.**



E. Synthesis: 12 Points

Synthesize the molecule below using any of the following reagents: any aldehydes or ketones of **three carbons** or less, benzene, cyclohexane, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



F. Spectroscopy: 12 Points

A compound with the formula $C_5H_8O_2$ 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.