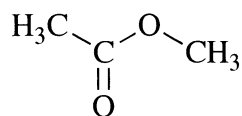
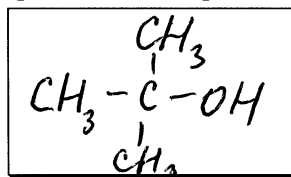
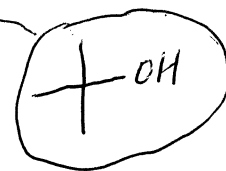
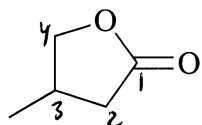


Key

SIGNATURE (required): _____

1. (4) Complete the following reaction by drawing **one** product in the provided box:1. CH_3Li (excess)2. H_2O , H^+ + CH_3OH

OK

2. (4) Circle the **name** of the major organic product obtained from the following reaction: H_2O , H_2SO_4

heat

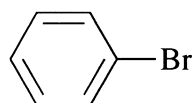
4-hydroxy-3-methylbutanoic acid

3-methylbutanoic acid

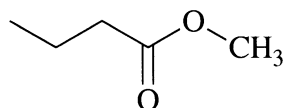
4-hydroxy-3-methylbutanal

4-hydroxy-3-methyl-2-butanone

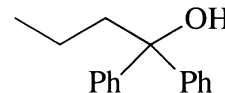
3. (4) Circle the major organic product obtained from the following sequence of reactions:

1. Mg 2. CO_2 3. H_2O , H_2SO_4 1. LiAlH_4 2. H_3O^+ , H_2O $\text{PhCH}_2\text{CO}_2\text{H}$ PhCH_2OH PhCO_2H PhCHO PhOH

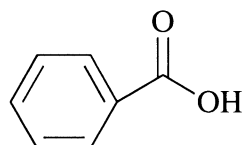
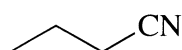
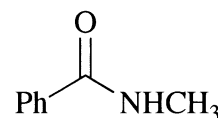
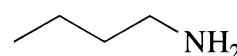
4. (6) Show the reagents (in boxes) that can be used to convert the reactant to the indicated product:

 PhLi

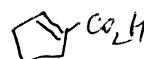
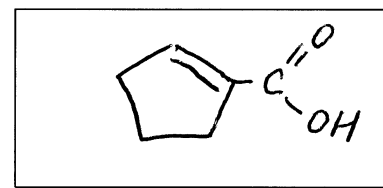
ether

 H_3O^+ H_2O OK

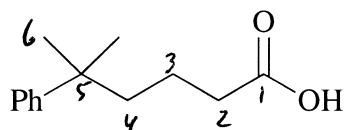
2 PhLi ,
2 PhMgBr
 PhLi (excess)
 PhMgBr (excess)

or PBr_3 SOCl_2 CH_3NH_2  LiAlH_4 H_2O 

OK
 H_3O^+ OK
 H^+

5. (2) Draw the **correct structure** of 1-cyclopentenecarboxylic acid:

6 (2) Circle the correct the IUPAC name of the following compound:



5,5-dimethyl-5-phenylbutanal

5,5-dimethyl-5-phenylpentanoic acid

5-methyl-5-phenylhexanoic acid

2,2-dimethylphenylpropanoic acid

7. (3) Which one of the following compounds has the **lowest** reactivity in **nucleophilic acyl substitution**?N-methyl benzamide

benzoyl chloride

propyl benzoate

benzoic anhydride

methyl benzoate