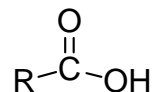
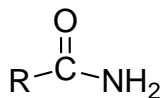
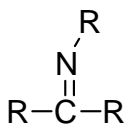
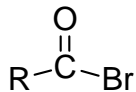
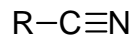
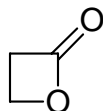
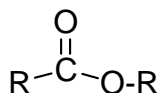
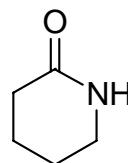
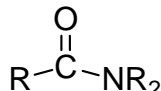
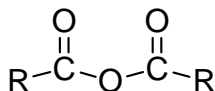


NAME: \_\_\_\_\_

To **not** have your graded script placed outside my office please check this box 

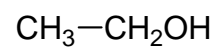
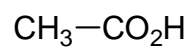
- 1) Name the general class of organic compounds that each of these molecules belong to. (15pts)
- 2) Draw in all the lone pairs on each molecule. (15pts)



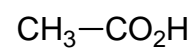
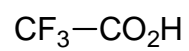
- 3) Circle the molecule with the most sp hybridized atoms. (2pts)
- 4) Put a cross through the molecule that contains the weakest  $\pi$  bond. (2pts)

5) Explain why the left hand side molecule is more acidic in both pairs  
(12pts)

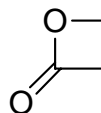
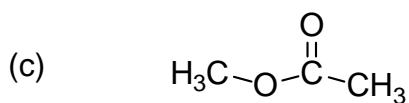
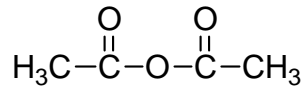
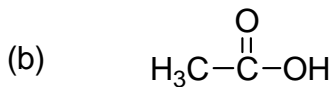
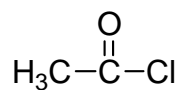
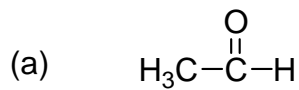
(a)



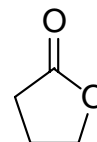
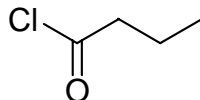
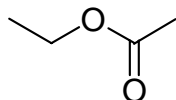
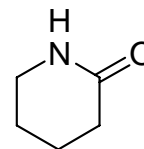
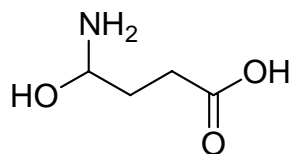
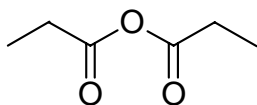
(b)



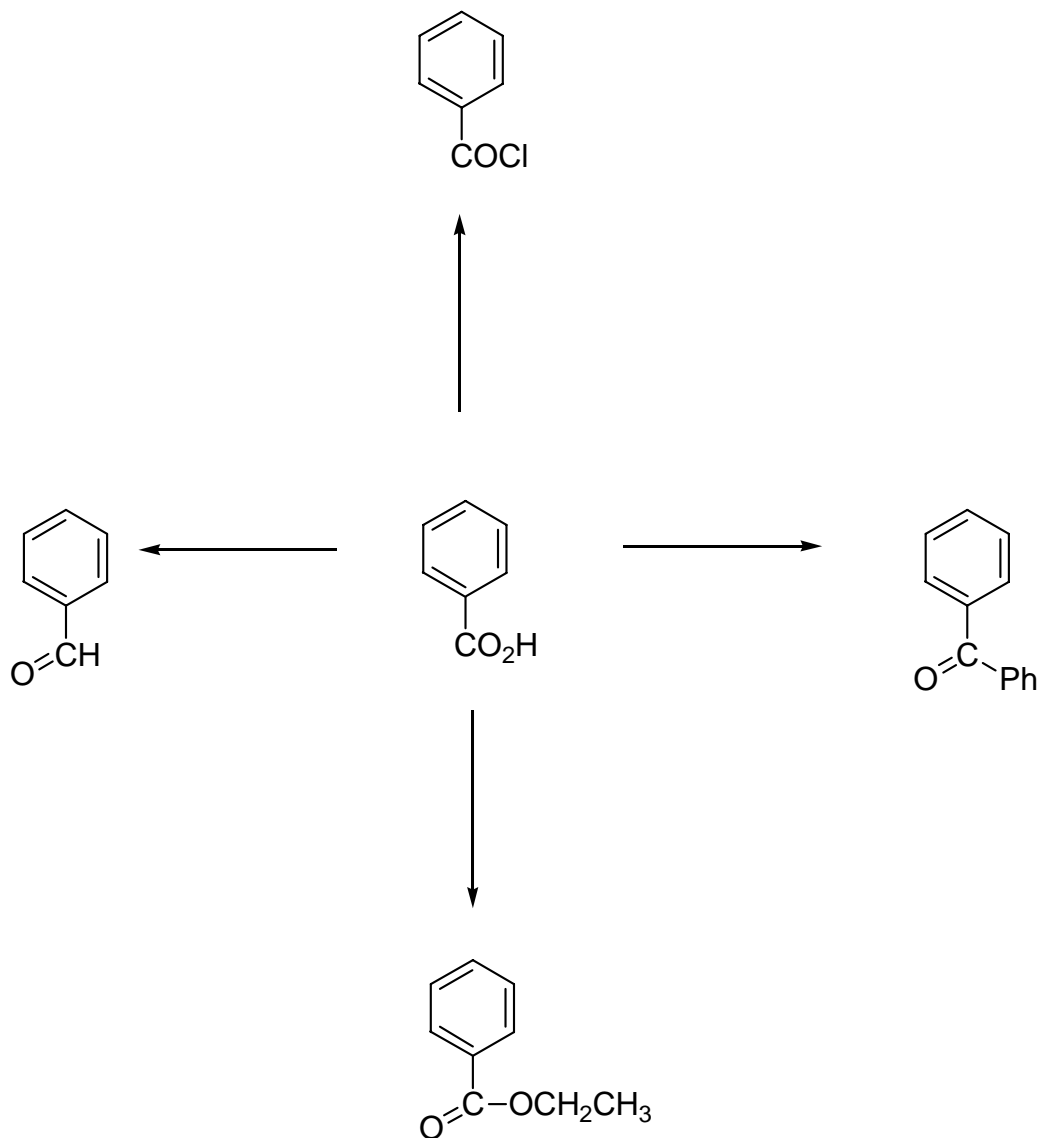
6) Circle the more reactive molecule with respect to nucleophilic acyl substitution and explain your answer briefly. (12pts)



7) Name the following compounds in IUPAC acceptable terms. (20pts)



8) Fill in the missing reagents. (12pts)



9) Draw the structure of the aromatic dicarboxylic acid **A**. (2pts)

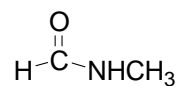
Write the mechanism for the reaction of **A** with ammonia to form the right hand side product (5pts)



Indicate which Hydrogen in the product is the most acidic, and explain your choice. (3pts)

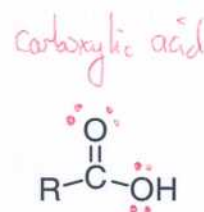
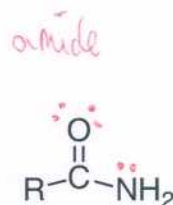
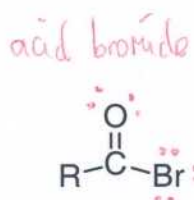
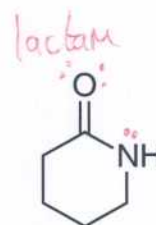
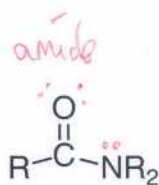
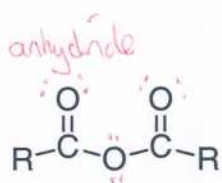
**\*Bonus question\* (up to 2pts)**

Explain why the amide below exists as two observable stereoisomers.



NAME: BINFU HELEN BACKTo **not** have your graded script placed outside my office please check this box 

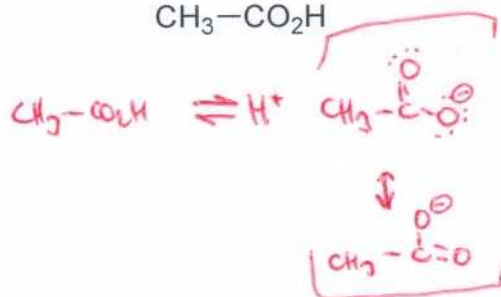
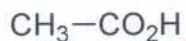
- 1) Name the general class of organic compounds that each of these molecules belong to. (15pts)
- 2) Draw in all the lone pairs on each molecule. (15pts)



- 3) Circle the molecule with the most sp hybridized atoms. (2pts) ✓
- 4) Put a cross through the molecule that contains the weakest π bond. (2pts) ✓

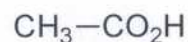
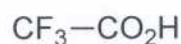
5) Explain why the left hand side molecule is more acidic in both pairs (12pts)

(a)



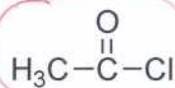
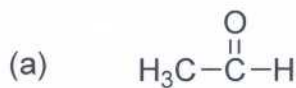
The acid on the left forms a more stable (resonance stabilized) anion when the proton is donated.

(b)

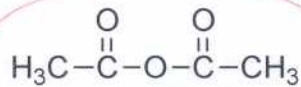
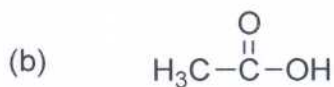


The  $\text{CF}_3$  group is strongly electron withdrawing, and this stabilizes the anion formed after proton donation. Thus the parent compound is more willing to give up a proton - hence a stronger acid.

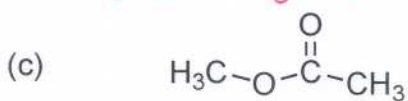
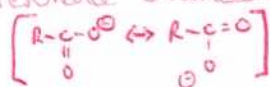
6) Circle the more reactive molecule with respect to nucleophilic acyl substitution and explain your answer briefly. (12pts)



Aldehydes generally do not undergo n.a.s reactions, whereas acid chlorides with their good leaving group ( $\text{Cl}^-$ ) and electrophilic carbonyl carbon are very reactive in n.a.s reactions.

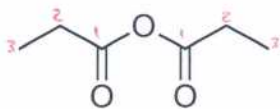


Anhydrides are more reactive than carboxylic acids because they have a better (resonance stabilized) leaving group, and also less resonance stabilization per carbonyl group.

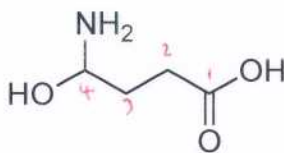


(small) Lactones are more reactive than esters since they can relieve ring strain upon n.a.s reactions.

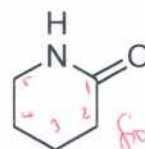
7) Name the following compounds in IUPAC acceptable terms. (20pts)



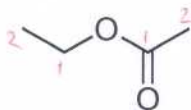
Propanoic Anhydride



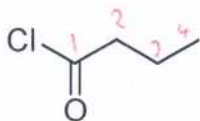
4-amino 4-hydroxybutanoic acid



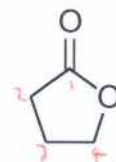
from   
5-aminopentanoic acid lactone



Ethyl acetate



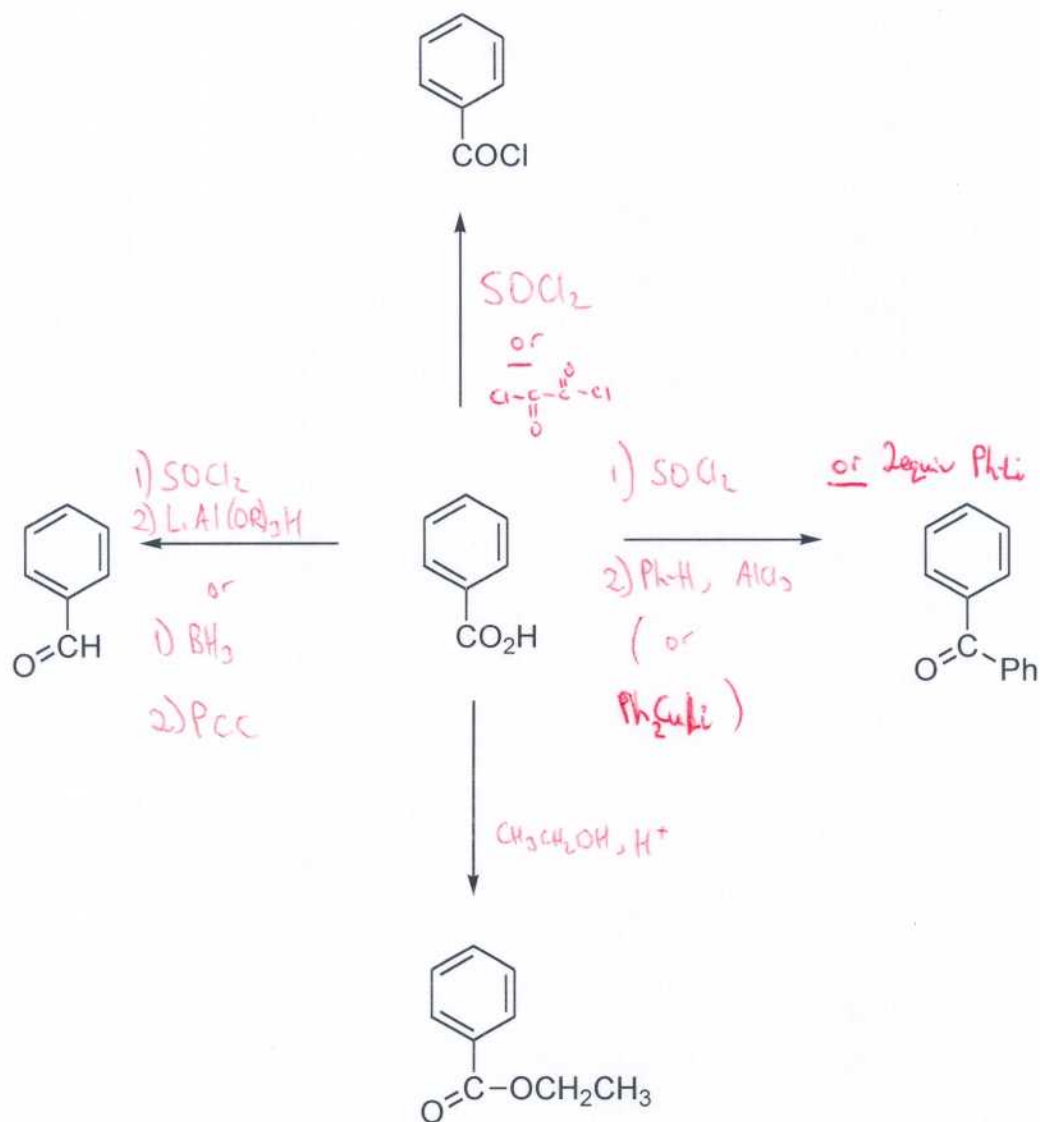
butanoyl chloride  
Sp02org2ex3



4-hydroxybutanoic acid lactone

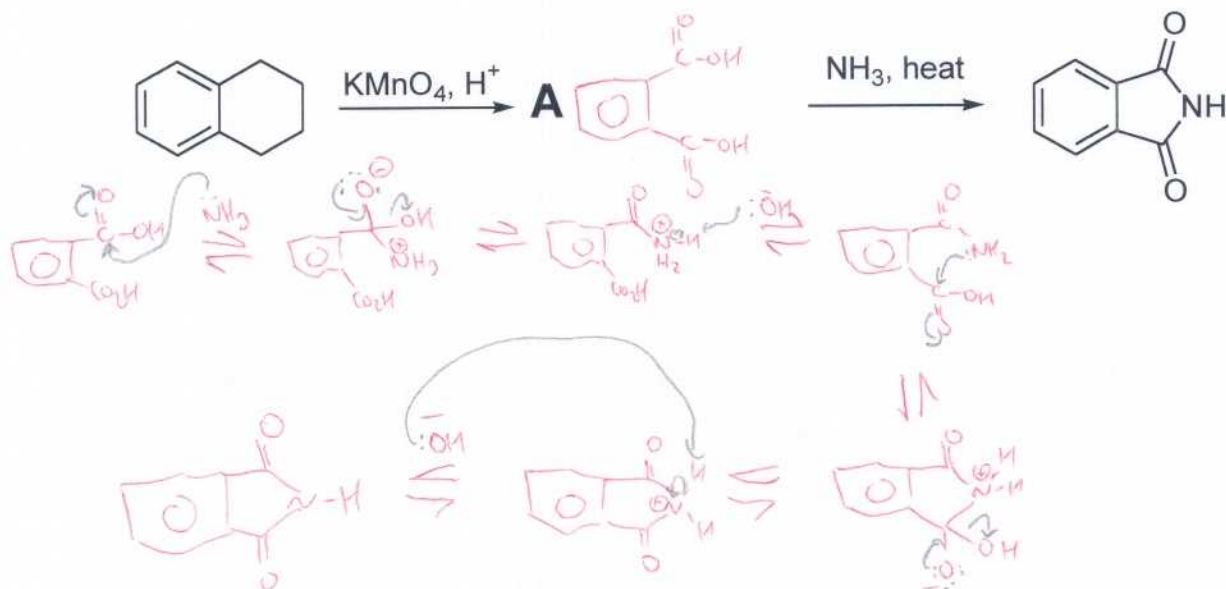
from

8) Fill in the missing reagents. (12pts)

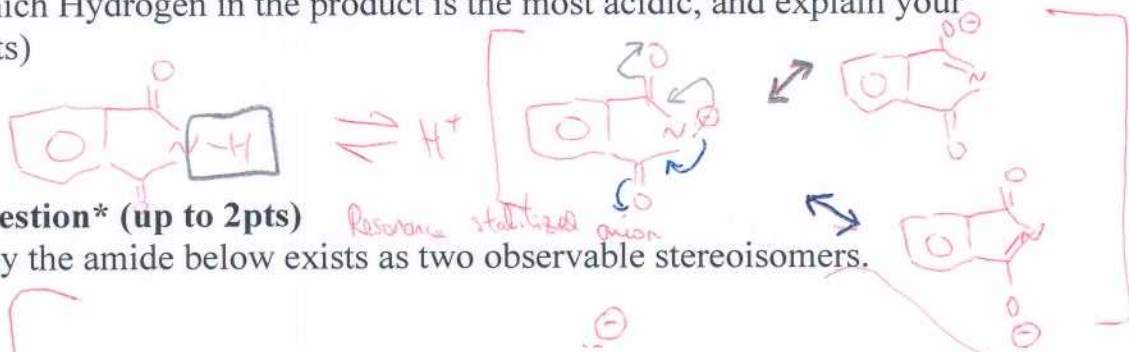


9) Draw the structure of the aromatic dicarboxylic acid A. (2pts)

Write the mechanism for the reaction of A with ammonia to form the right hand side product (5pts)

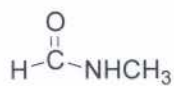


Indicate which Hydrogen in the product is the most acidic, and explain your choice. (3pts)



**\*Bonus question\* (up to 2pts)**

Explain why the amide below exists as two observable stereoisomers.



The partial C=N character leads to cis & trans isomers of this amide.

