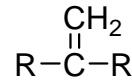
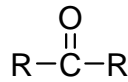
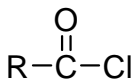
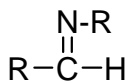


NAME: \_\_\_\_\_

If you do **not** wish to have your script placed outside my office, then please check this box \_\_\_

1) Name the general class of organic molecules that each of these molecules belong to, and **circle** the most reactive molecule with respect to undergoing nucleophilic attack. (7pts)



2) Draw a Lewis structure including lone pairs for the following similar but different species: (10pts)

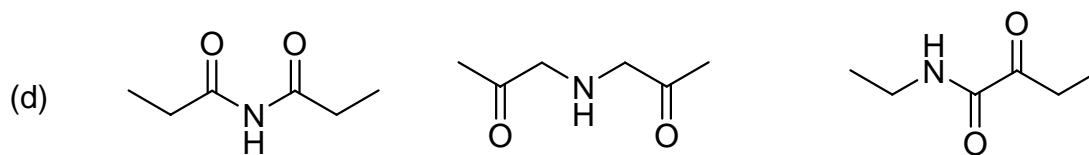
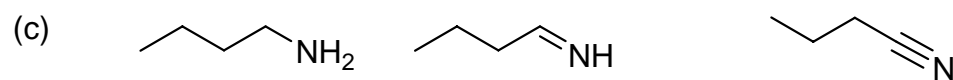
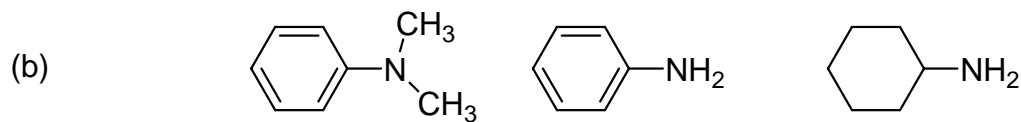
*Nitronium Ion*  $\text{NO}_2^+$

*Nitrosonium Ion*  $\text{NO}^+$

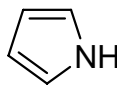
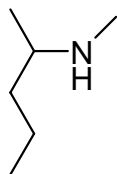
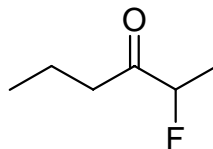
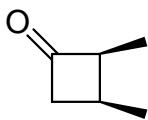
*Nitric Acid*  $\text{HONO}_2$

*Nitrous Acid*  $\text{HONO}$

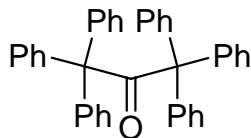
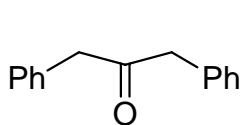
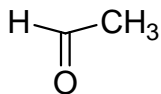
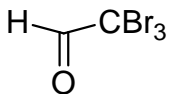
3) Circle the *stronger base* in the following threesomes (no need to explain).  
(10pts)



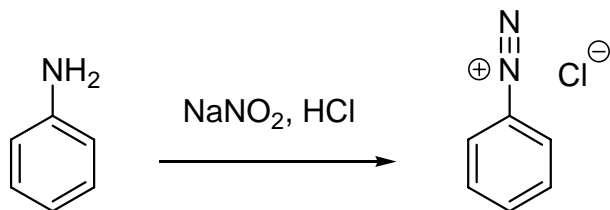
4) Name the following compounds in IUPAC acceptable terms. (12pts)



5) Explain briefly why in both pairs, the molecule on the left is more reactive toward nucleophilic attack. (7pts)

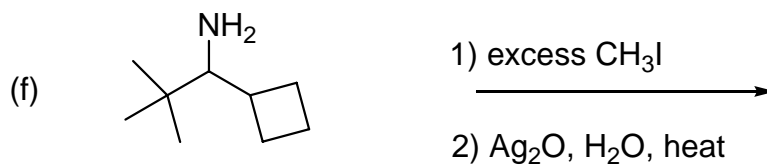
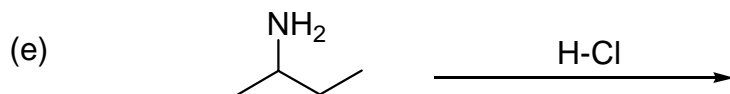
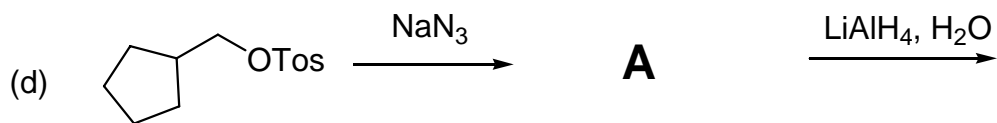
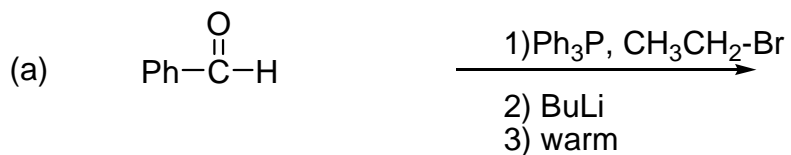


6) Write the full mechanism for the reaction of aniline with  $\text{NaNO}_2$  in  $\text{HCl}$  to generate a diazonium salt. (18pts)

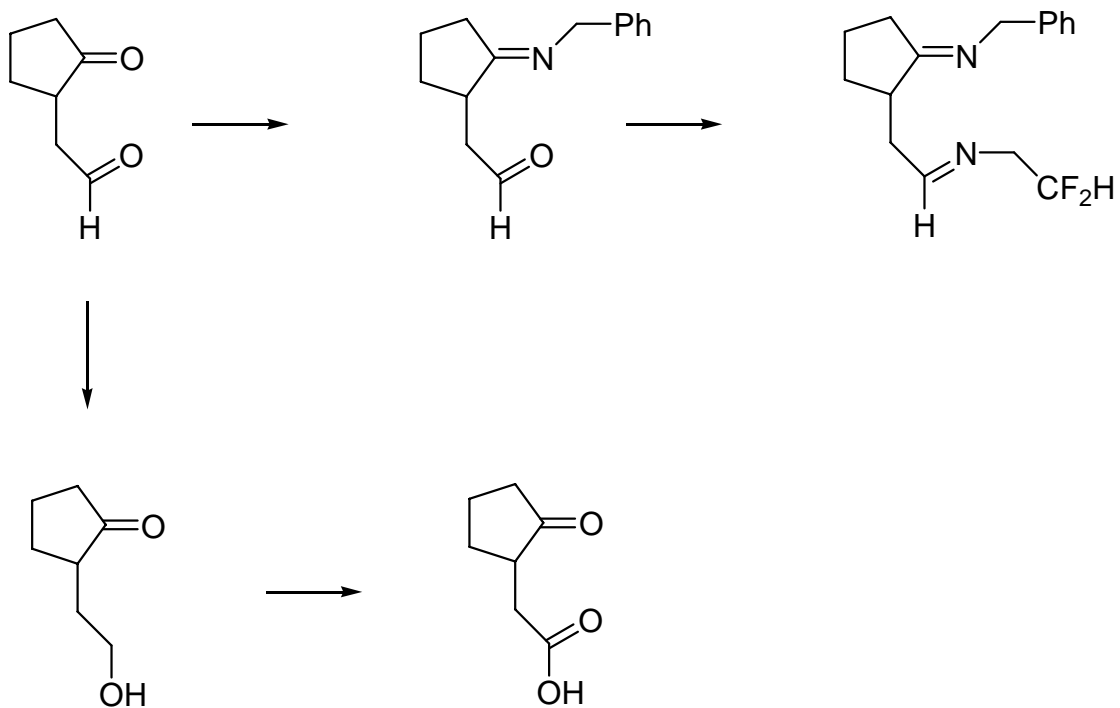


*Ensure that your mechanism includes how sodium nitrite and hydrochloric acid produce nitrous acid (HONO); how nitrous acid is dehydrated to produce the nitrosonium cation; and how the amine reacts with the nitrosonium cation to produce the diazonium salt.*

7) Give the products formed in **five** of the following reactions. (15pts)



8) Give reagents for the following transformations. (12pts)



9) Write the mechanism for the **acid** catalyzed hydration of propanone (acetone) (9pts)

**\*Bonus question\* (up to 3pts)**

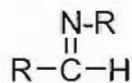
List three things that Dr. Roche says in (almost) every class.

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

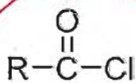
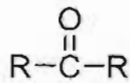
B. SAFE USE  $\text{H}_2\text{O}_2$ ,  $\text{H}_2\text{O}^+$  !!!

If you do **not** wish to have your script placed outside my office, then please check this box \_\_\_\_\_

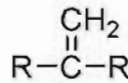
1) Name the general class of organic molecules that each of these molecules belong to, and **circle** the most reactive molecule with respect to undergoing nucleophilic attack. (7pts)



IMINE

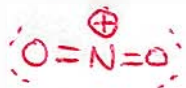
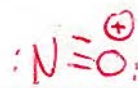
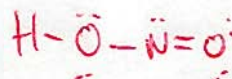
ACID  
CHLORIDE

KETONE

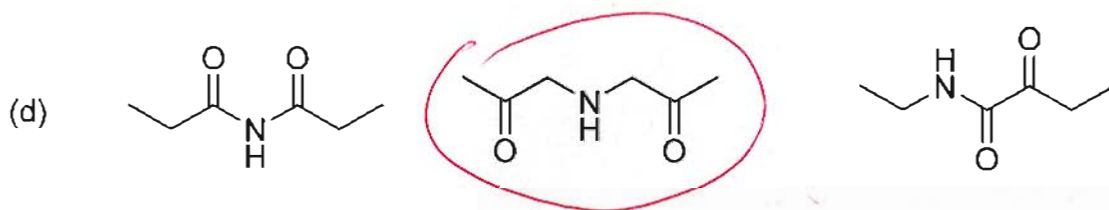
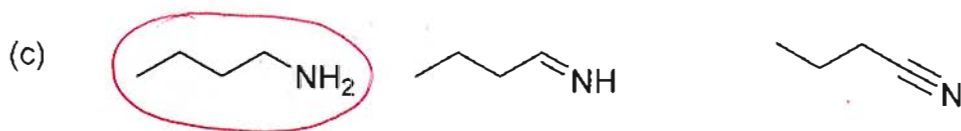
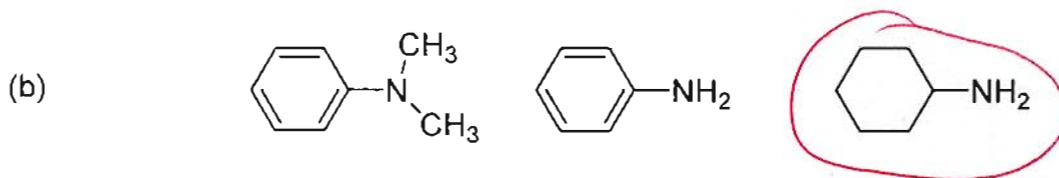
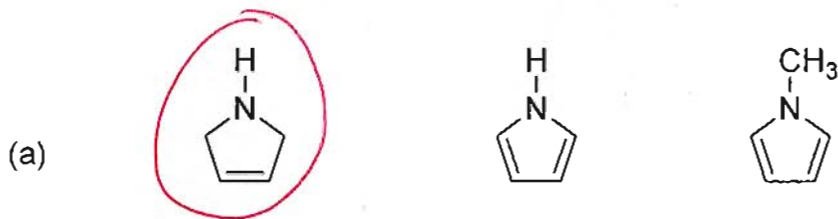


ALKENE

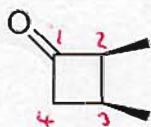
2) Draw a Lewis structure including lone pairs for the following similar but different species: (10pts)

Nitronium Ion  $\text{NO}_2^+$ Nitrosonium Ion  $\text{NO}^+$ Nitric Acid  $\text{HONO}_2$ Nitrous Acid  $\text{HONO}$ 

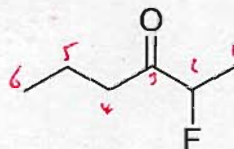
3) Circle the *stronger base* in the following threesomes (no need to explain).  
(10pts)



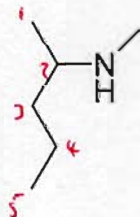
4) Name the following compounds in IUPAC acceptable terms. (12pts)



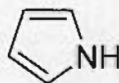
cis-2,3-dimethylcyclobutanone



2-FLUORO-3-HEXANONE

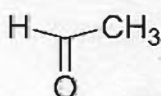
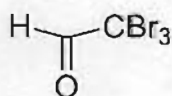


N-Methyl-2-pentanamine

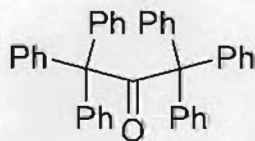
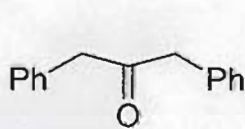


PYRROLE

5) Explain briefly why in both pairs, the molecule on the left is more reactive toward nucleophilic attack. (7pts)

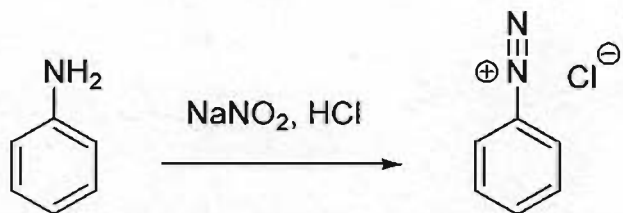


The C=O double bond has significant +ve charge on the carbon. The electron withdrawing -CBr<sub>3</sub> group increases the +ve charge on that carbon. A nucleophile is attracted to the +ve charge.

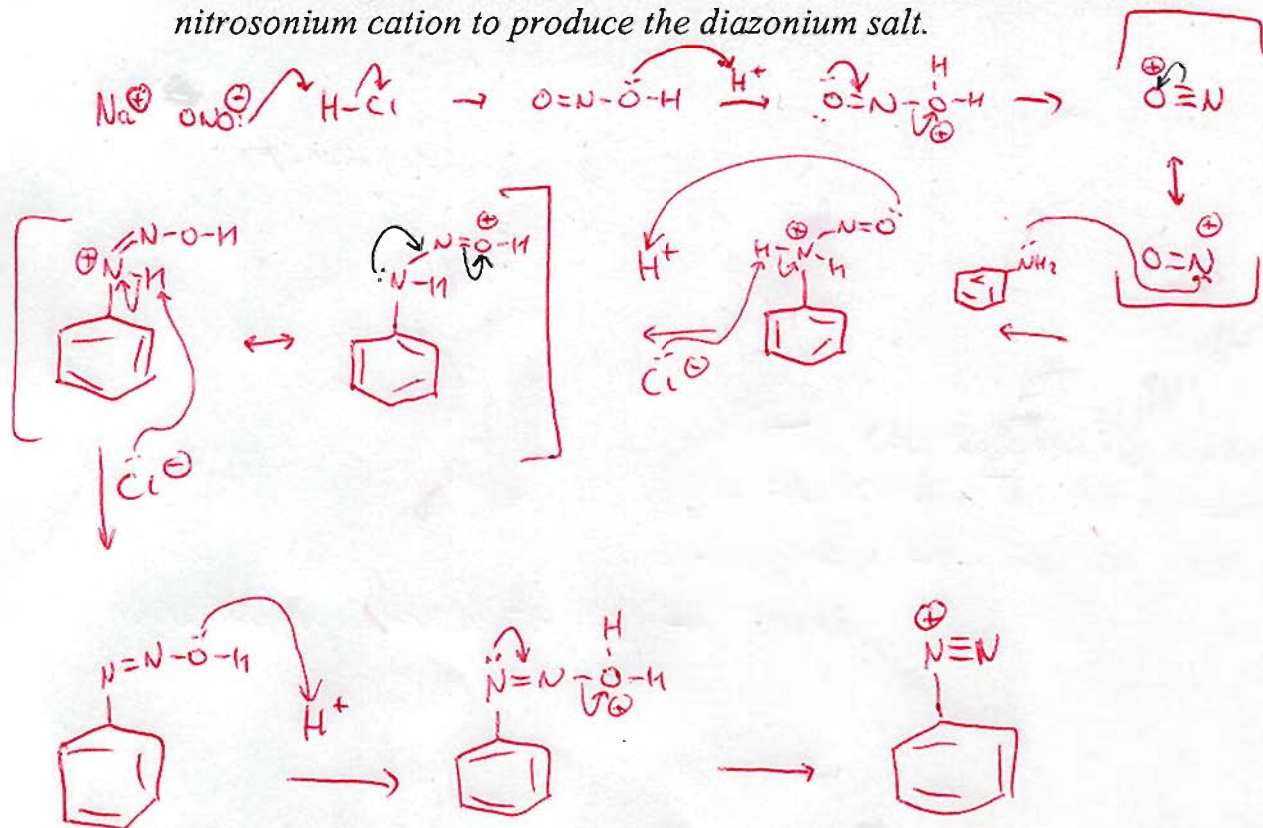


The left hand side C=O is less sterically hindered, and so the nucleophile can more easily approach and attack the carbonyl carbon.

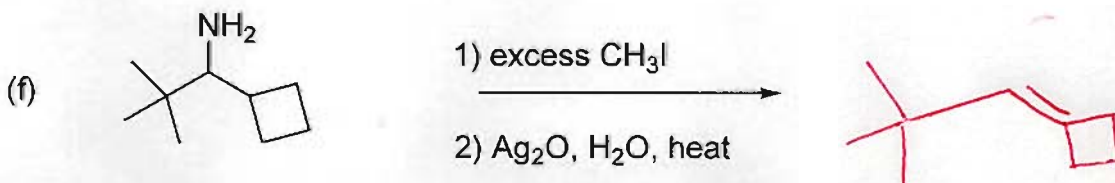
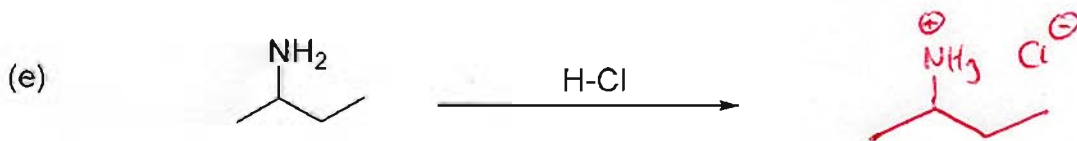
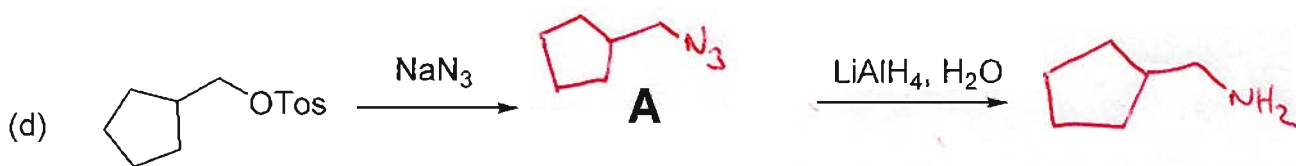
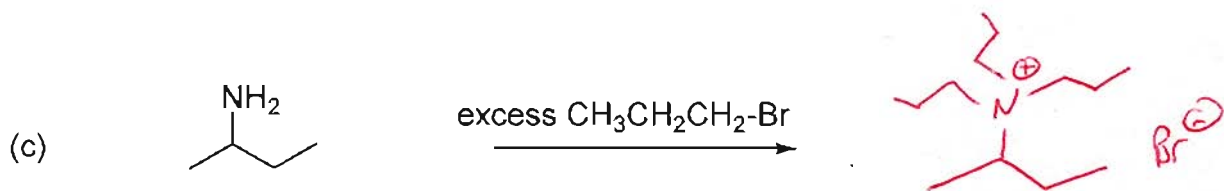
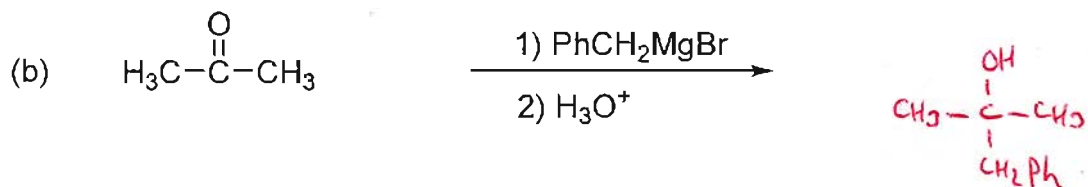
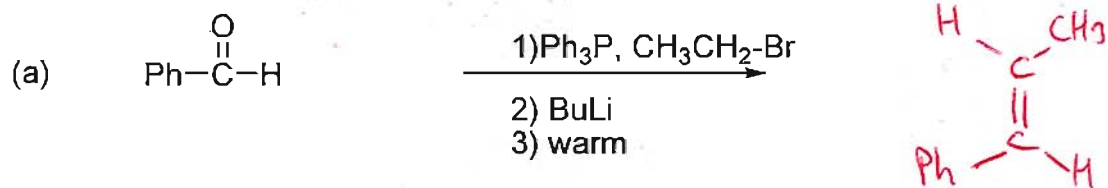
6) Write the full mechanism for the reaction of aniline with  $\text{NaNO}_2$  in  $\text{HCl}$  to generate a diazonium salt. (18pts)



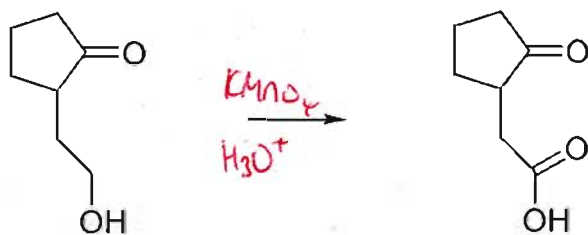
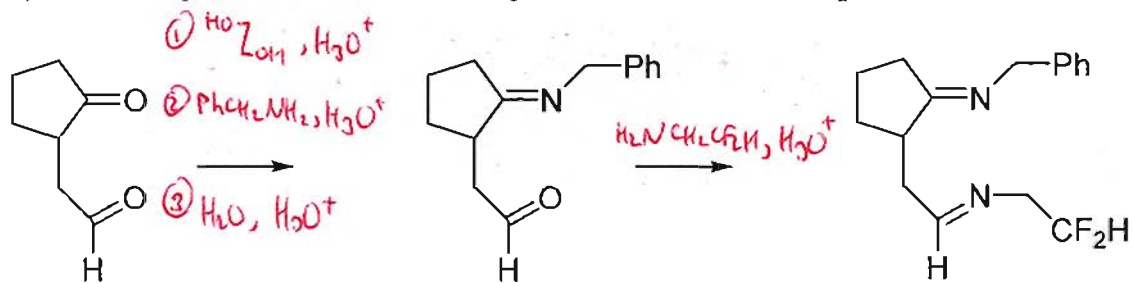
Ensure that your mechanism includes how sodium nitrite and hydrochloric acid produce nitrous acid ( $\text{HONO}$ ); how nitrous acid is dehydrated to produce the nitrosonium cation; and how the amine reacts with the nitrosonium cation to produce the diazonium salt.



7) Give the products formed in five of the following reactions. (15pts)



8) Give reagents for the following transformations. (12pts)



9) Write the mechanism for the **acid** catalyzed hydration of propanone (acetone) (9pts)

