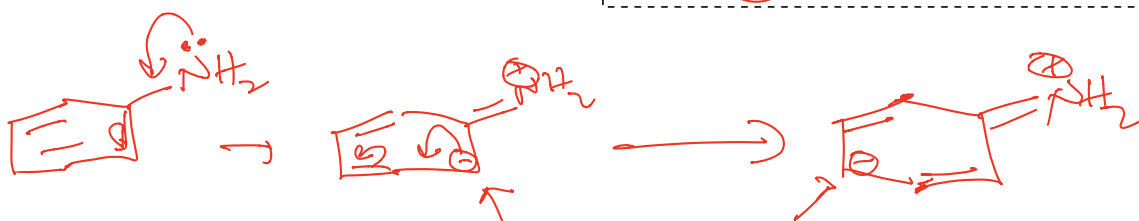
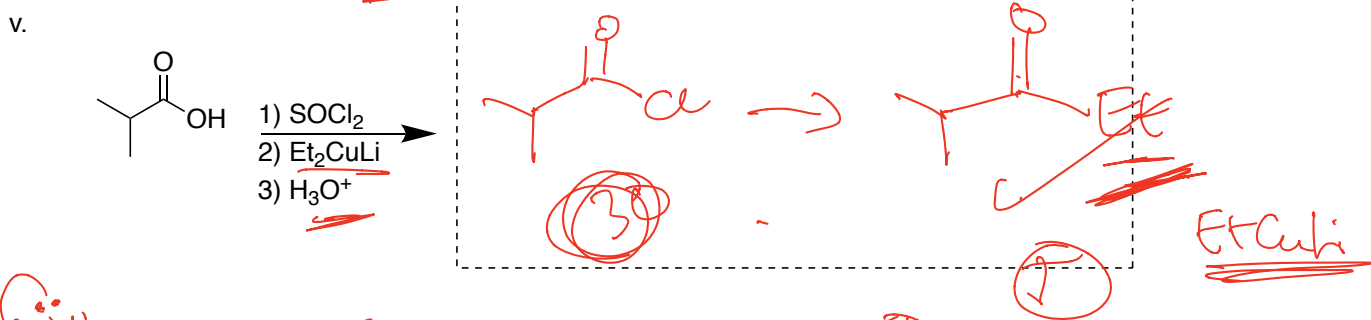
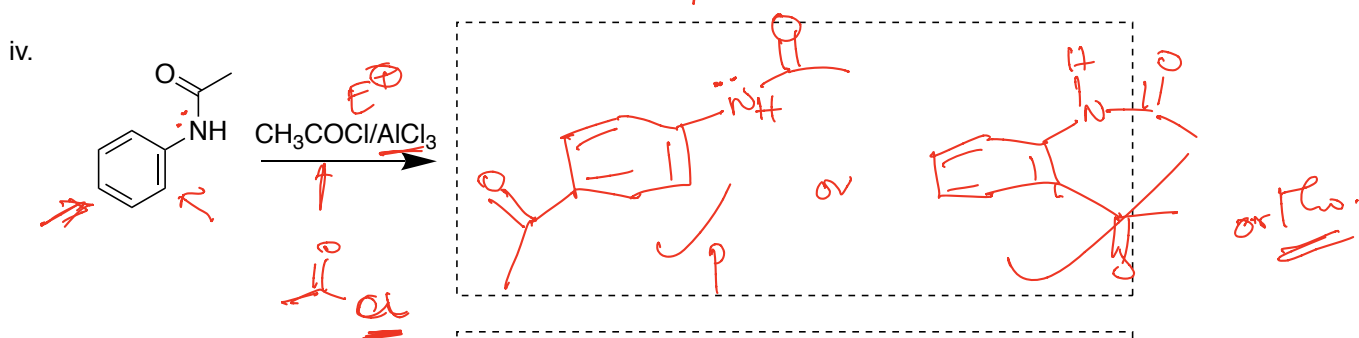
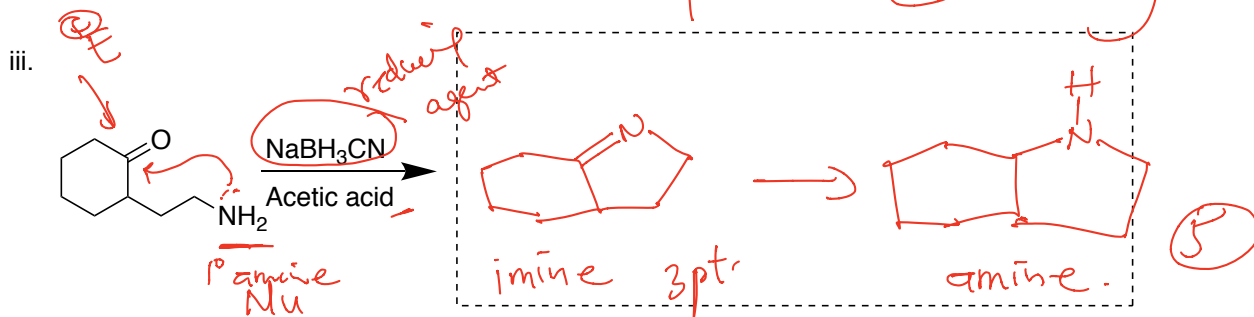
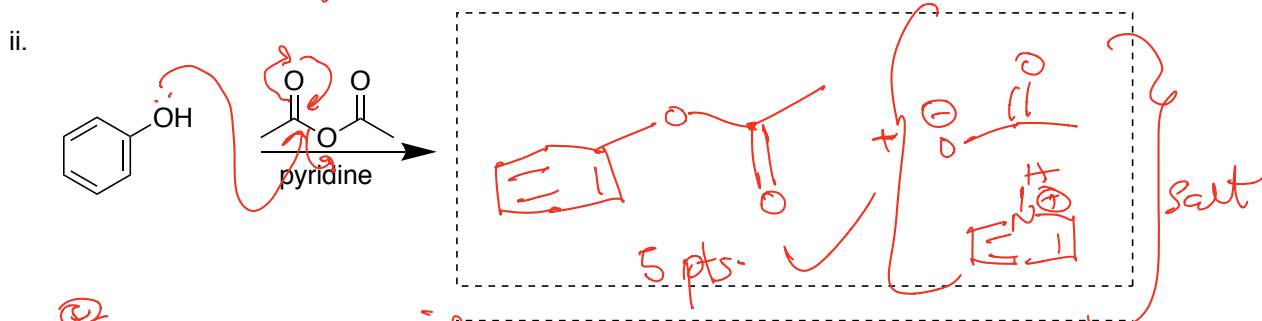
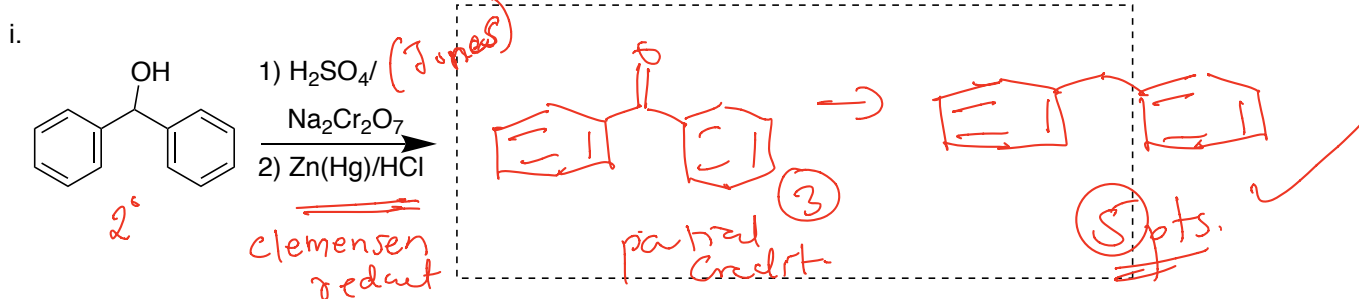


PRACTICE QUESTIONS FOR FINAL EXAM — CEM 252 SUMMER

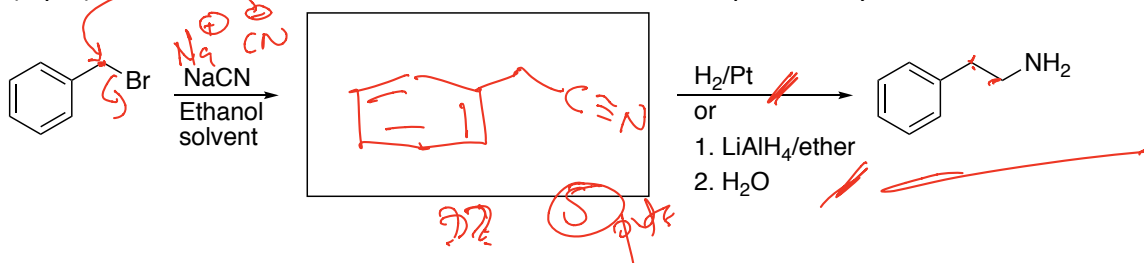
1. (25 pts) **Simple syntheses:** In the boxes provided, draw the major organic products for each of the following reactions (5 pts each).



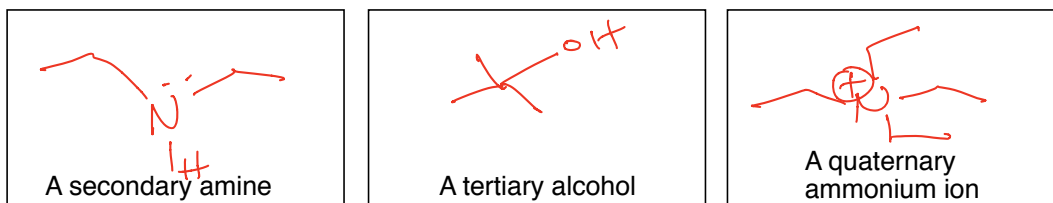
activated

## 2. (35 pts) Reactions and mechanisms of amines:

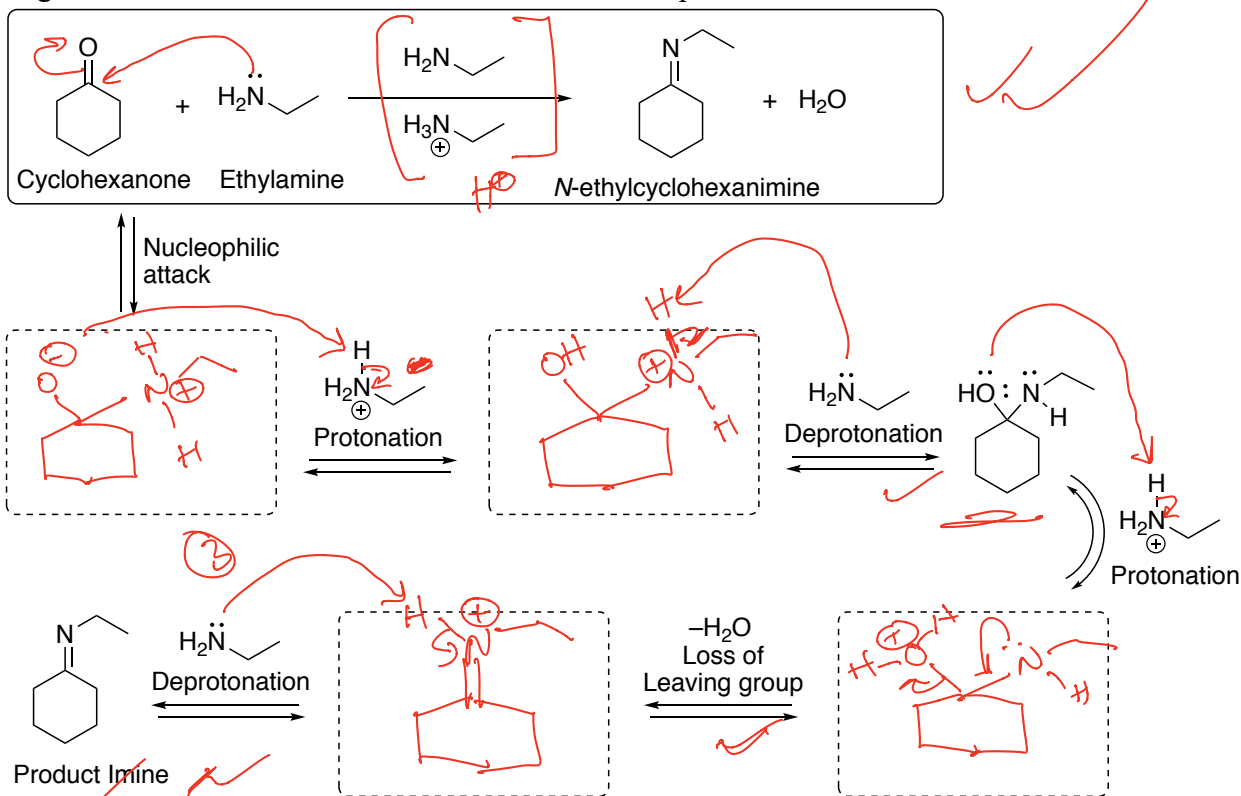
(a) (5 pts) In the box, draw the intermediate in this two-step amine synthesis:



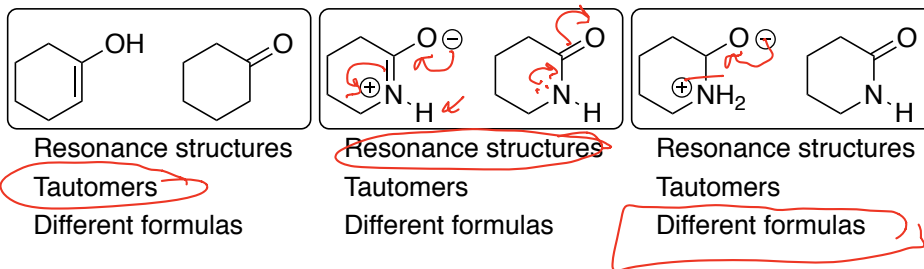
(b) (6 pts) In the boxes, draw simple examples of the requested compound types:



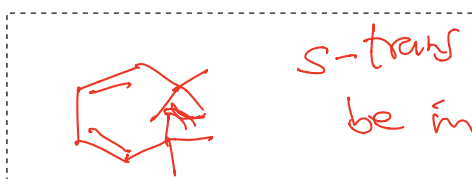
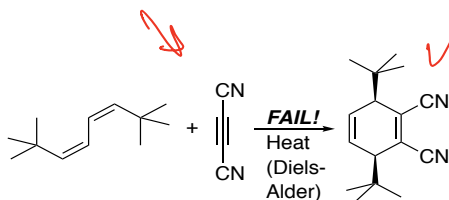
(c) (24 pts) Draw the intermediates (3 pt each) in the dotted boxes below and add arrows to show the mechanism for the imine-forming reaction of cyclohexanone with ethylamine. Be sure to include arrows (1 pt each) to move electrons. Ethylamine is the nucleophilic reagent, while  $\text{EtNH}_3^+/\text{EtNH}_2$  is the acid/base set for proton transfer.



(a) (6 pts) Consider the three pairs of structures below. Are they resonance structures, tautomers or different formulas (circle your answer), 2 pts each.

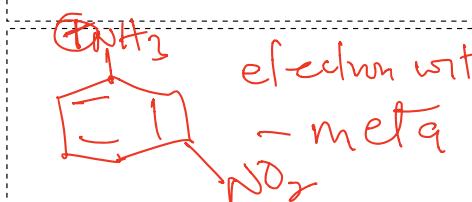
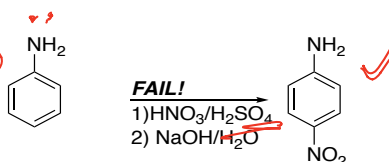


2. (10 pts) **Extra credit: Igor's Errors:** Igor, your clumsy lab assistant, attempts to earn your favor by running extra reactions at night, without your advice. In each case, the reactions fail. Shown below are five of his failures, showing reagents, conditions, and the product he had intended to form. For each case, write just **one or two sentences** to explain what went wrong in the box at right. If you can identify a **problem intermediate** or product that formed instead of the desired material, draw it along with your explanation.

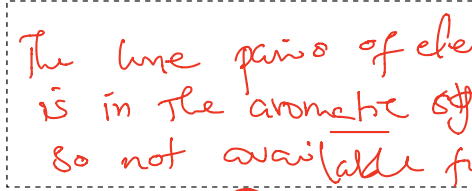
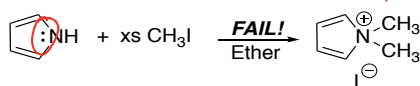


s-trans-diene cannot be in s-cis diene for D.A because sterics.

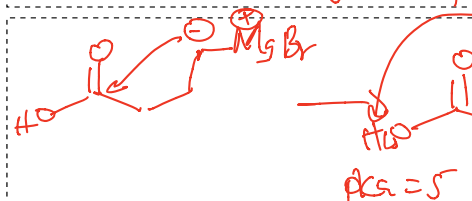
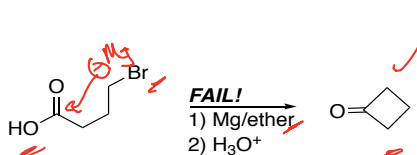
electron donating



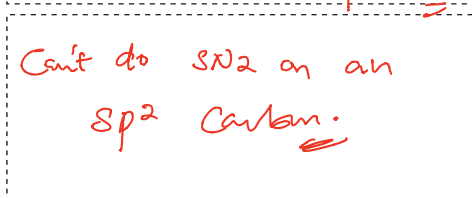
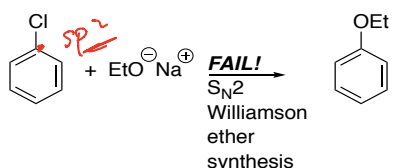
electron withdrawing - meta



The lone pairs of electron is in the aromatic system so not available for SN2 (NO react)



psi = 5

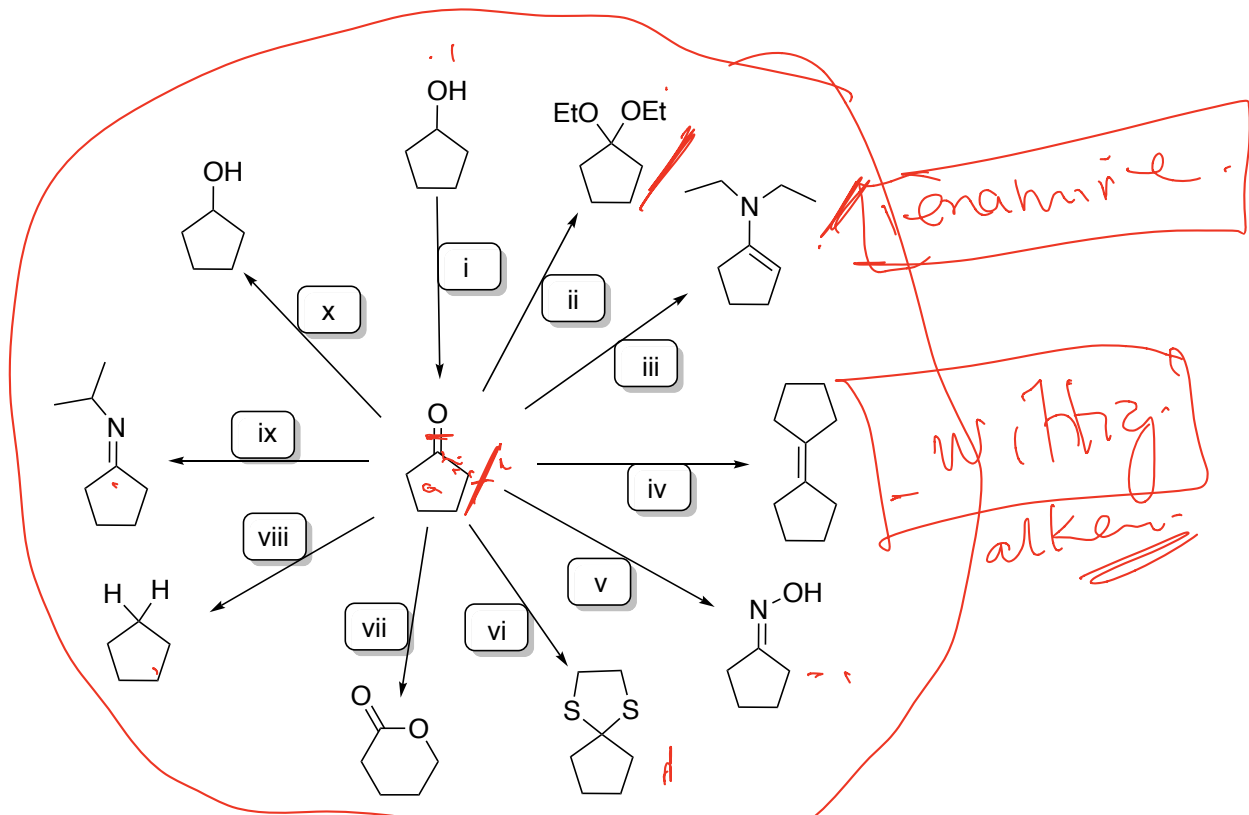


Can't do SN2 on an sp2 carbon.



3. (10 pts, 1 pt. each) For the following transformations (i-x), choose the appropriate letter from the "reagent shelf" below. Each box only gets one letter. If needed, you may use the same reagent more than once.

19) i, j  
 ii, k  
 iii, i  
 iv, h  
 v, c  
 vi, a  
 vii, g  
 viii, f  
 ix, e  
 x, l



- A)  $\text{HS-CH}_2\text{-CH}_2\text{-SH} \xrightarrow{[\text{H}^+]}$
- B)  $\xrightarrow[2. \text{H}_2\text{O}]{1. \text{LiAlH}_4}$
- C)  $\xrightarrow[[\text{H}^+]]{\text{NH}_2\text{OH}}$
- D)  $\text{HO-CH}_2\text{-CH}_2\text{-OH} \xrightarrow{\text{H}^+}$
- E)  $\text{Cyclopentyl-NH}_2 \xrightarrow{\text{H}^+}$
- F)  $\xrightarrow[2. \text{KOH/H}_2\text{O/heat}]{1. \text{H}_2\text{N-NH}_2 / \text{H}^+}$
- G)  $\xrightarrow{\text{RCO}_3\text{H}}$
- H)  $\text{Cyclopentyl-PPh}_3 \xrightarrow{\quad}$
- I)  $\text{N,N-diethylcyclopent-1-en-1-amine} \xrightarrow{\text{H}^+}$
- J)  $\xrightarrow[\text{H}_2\text{SO}_4/\text{H}_2\text{O}]{\text{NaCr}_2\text{O}_7}$
- K)  $\xrightarrow[[\text{H}^+]]{\text{EtOH}}$
- L)  $\xrightarrow[2. \text{H}_2\text{O}]{1. \text{Cyclopentyl-MgBr}}$