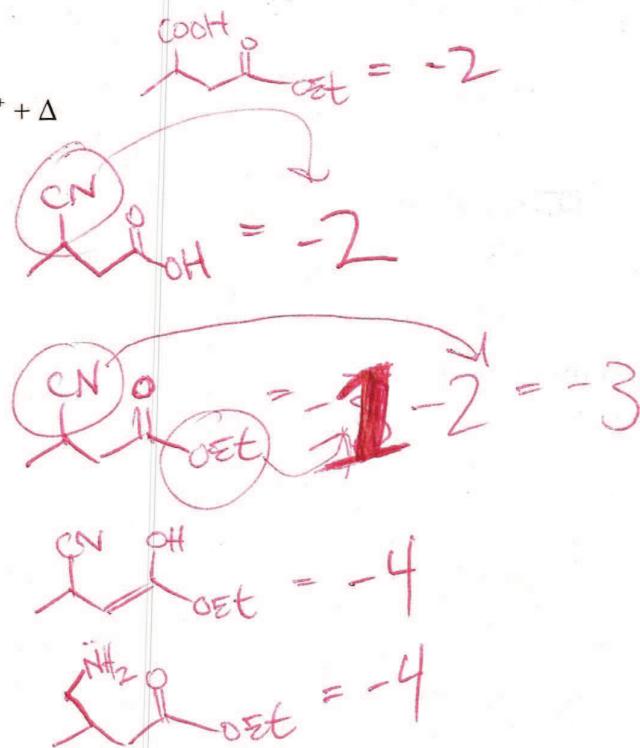
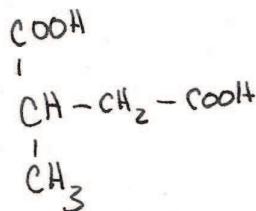


Chemistry 3331-100
Organic Chemistry / Dr. Barney Ellison
Thursday: Nov. 18th @ 7:00pm → 9:00 / 3rd Exam / Hale Science 230-270)

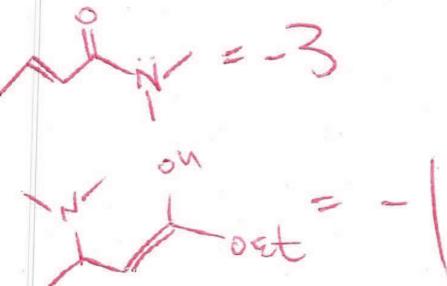
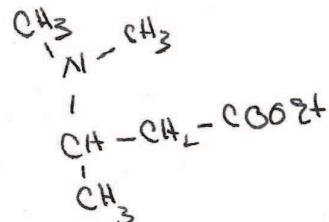
Name: Key (please print)

1. (20 pts) What are the products formed when ethyl *trans*-butenoate (*trans*-CH₃CH=CH-COOEt) reacts with:

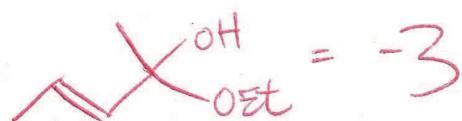
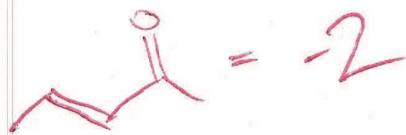
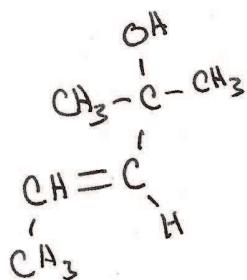
a) CN⁻ in EtOH followed by H₂O/H₃O⁺ + Δ



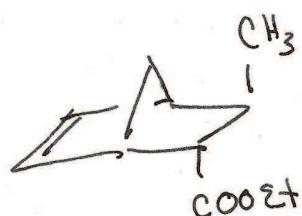
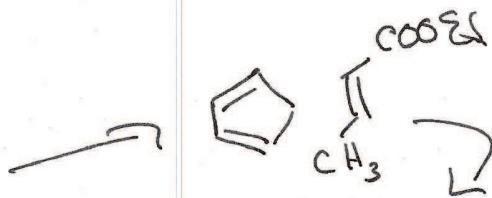
b) (CH₃)₂NH at room temperature



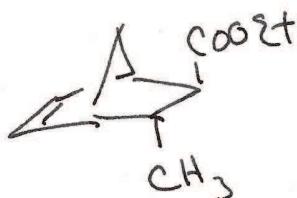
c) CH_3Li (excess) followed by $\text{H}_3\text{O}^+/\text{H}_2\text{O}$



d) 1, 3 cyclopentadiene



+



~~mixture~~

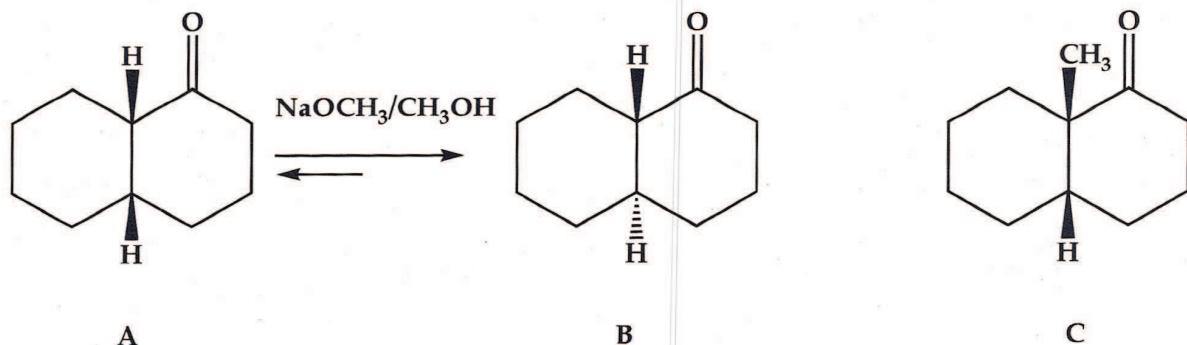
IF ONLY ONE = -1
ISOMER

UNLABELED STEREOCHEM = -1

2. (10 pts) When compound A is treated with $\text{CH}_3\text{OH}/\text{CH}_3\text{ONa}$, isomerization to compound B follows.

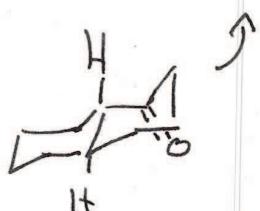
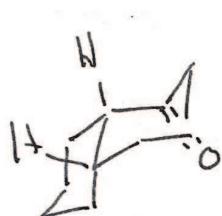
- a) What is the mechanism for the reaction? Why does the equilibrium favor B?

b) If ketone C is subjected to the same conditions, no reaction occurs. Why?



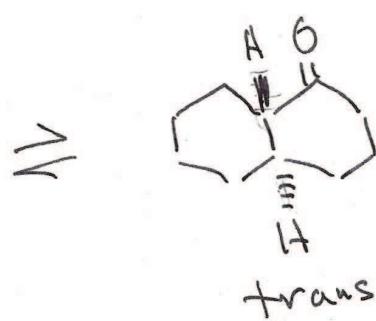
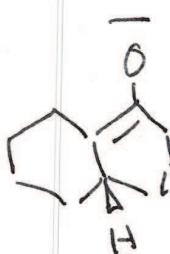
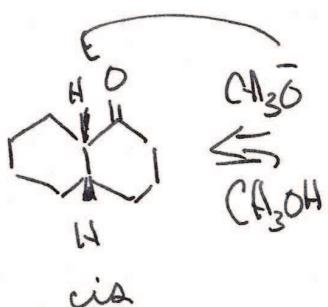
cis less stable

trans more
stable than cis

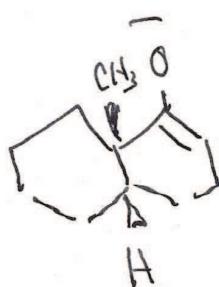
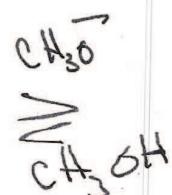
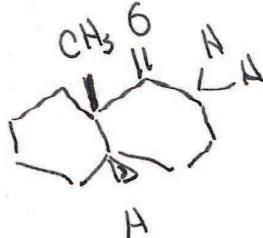


A

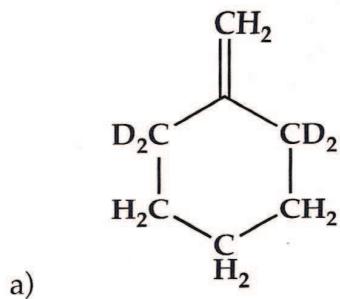
Mech.



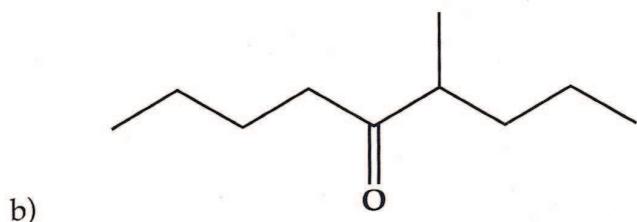
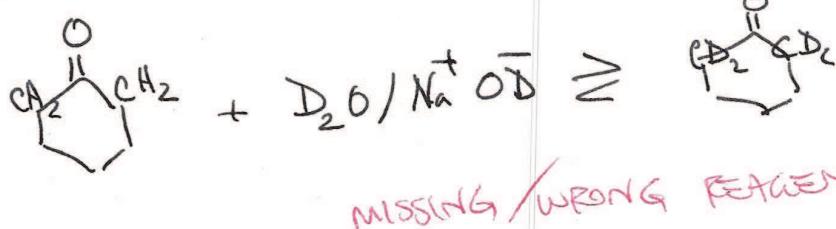
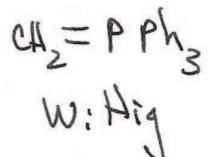
3



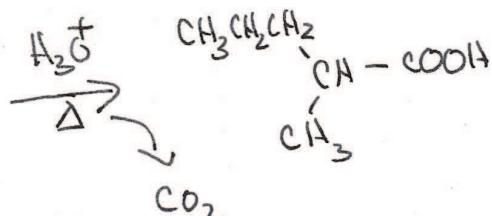
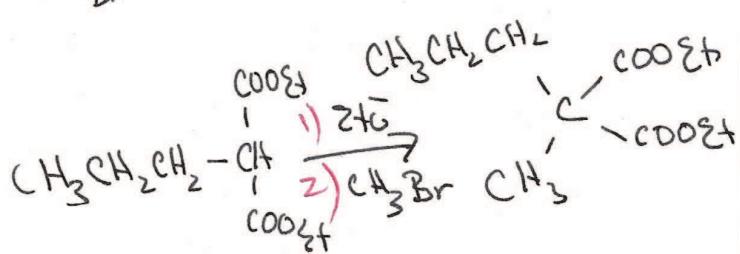
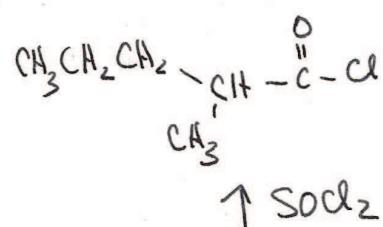
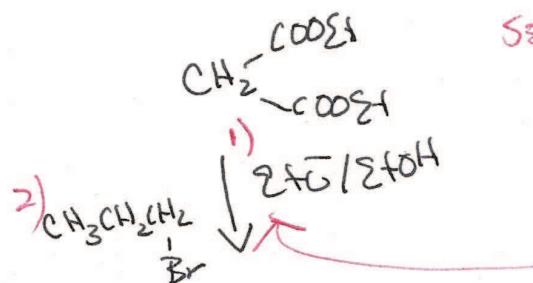
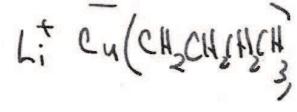
3. (10 pts) Devise a synthesis of the following targets. Use the indicated starting material and any other reagents you require.



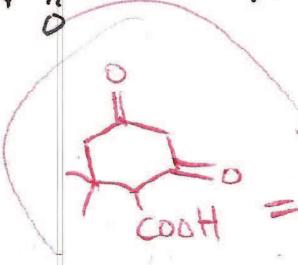
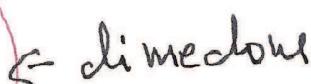
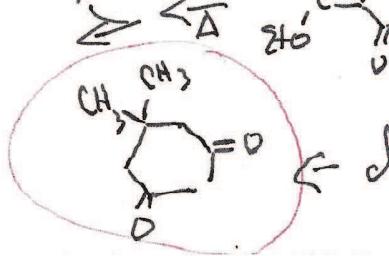
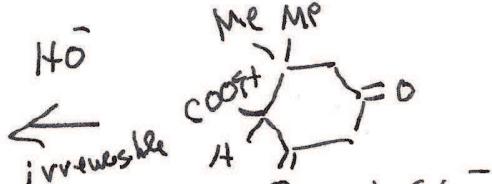
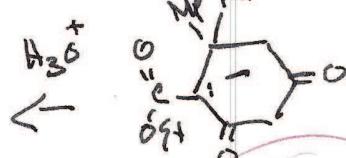
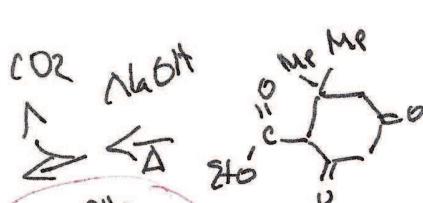
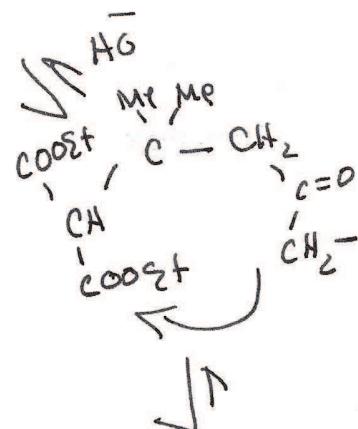
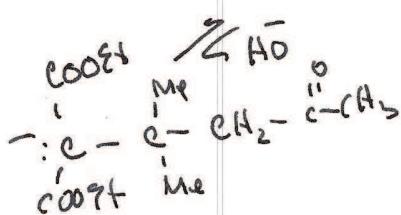
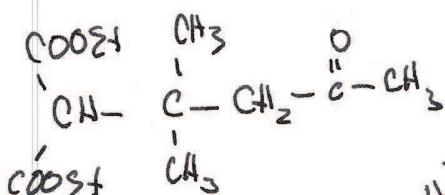
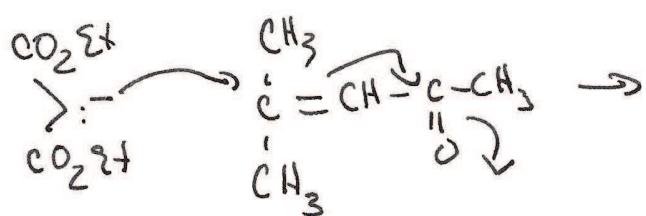
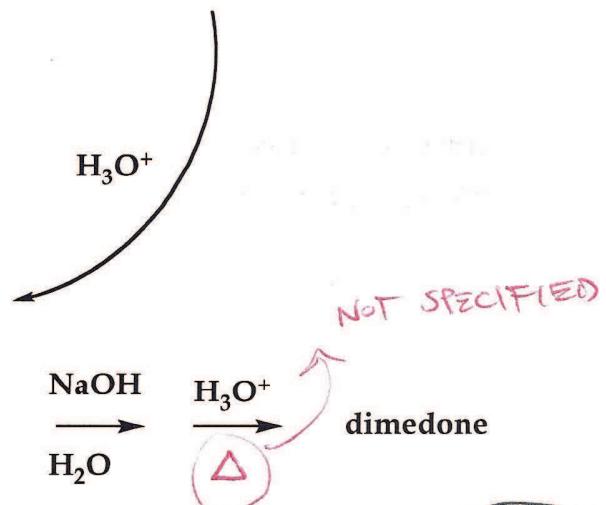
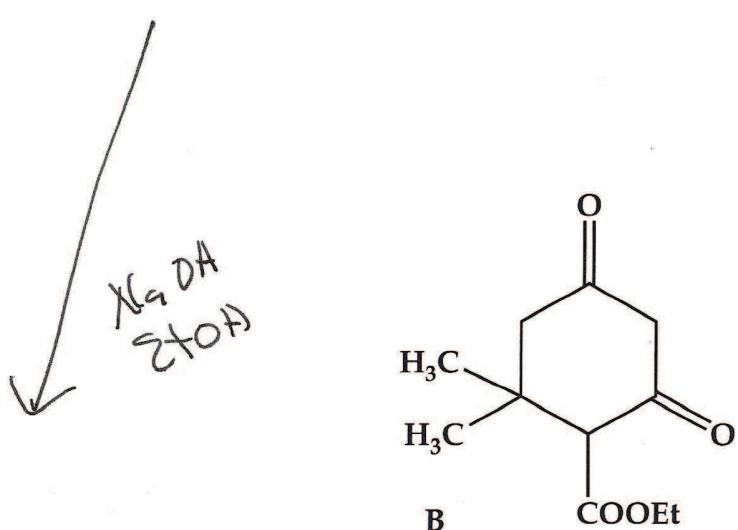
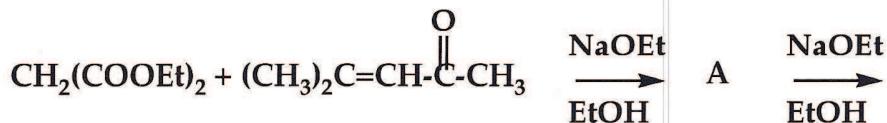
from cyclohexanone



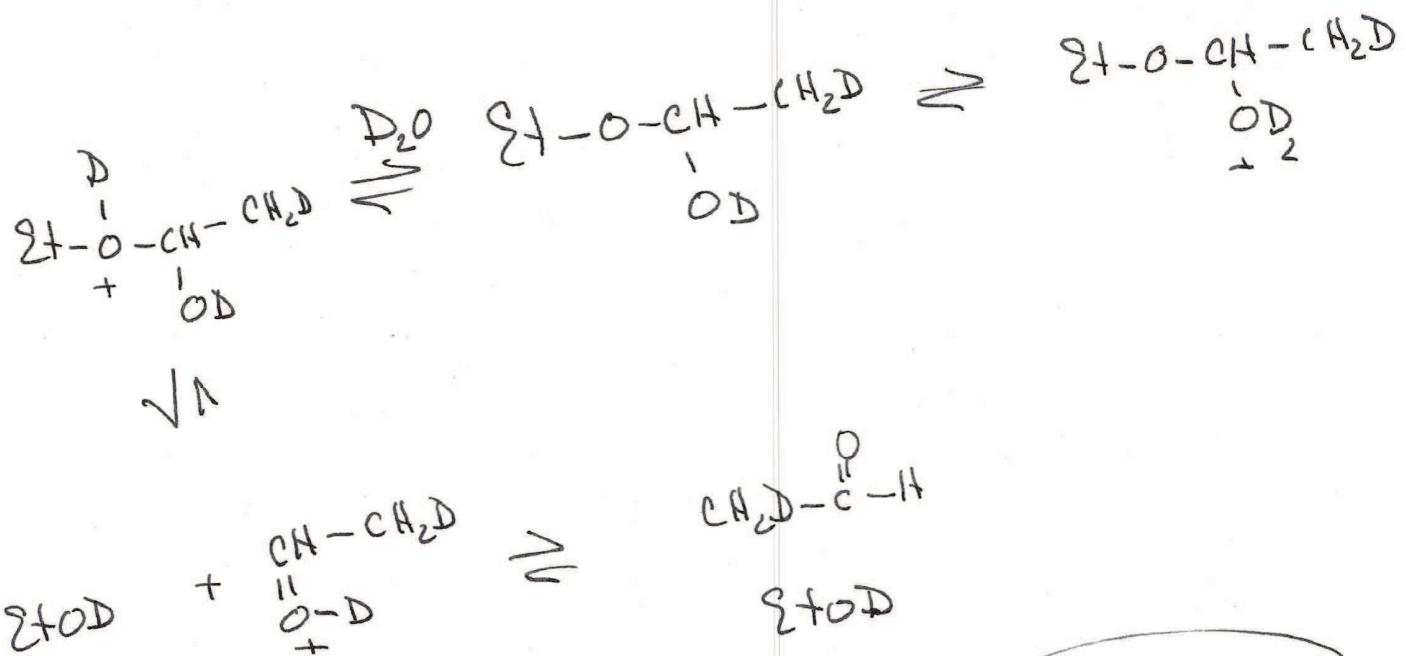
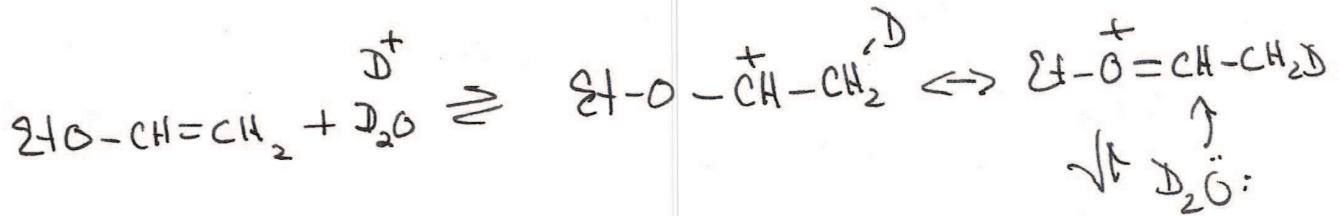
from $\text{CH}_2(\text{COOEt})_2$



4. (10 pts) Dimedone can be prepared by the following route. What is the structure of A (a Michael-addition product) and dimedone? Provide a mechanism for each step up to compound B.

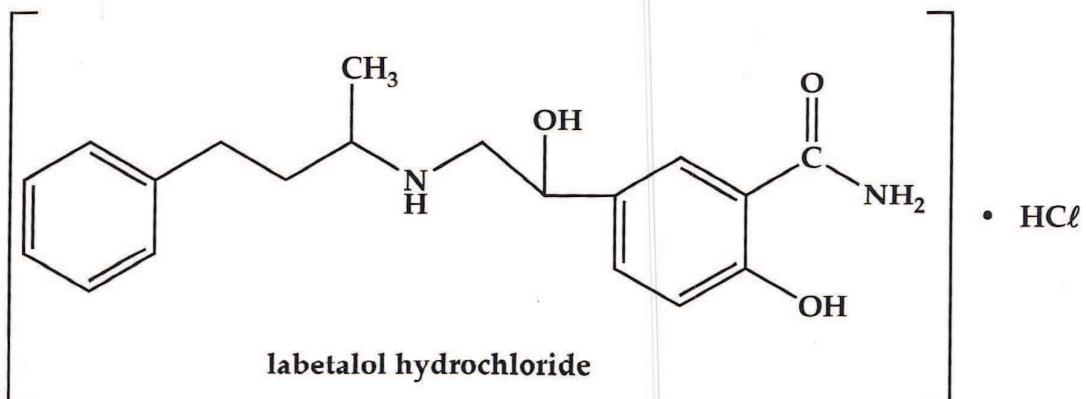


5. (10 pts) Ethyl vinyl ether, EtO-CH=CH_2 , hydrolyzes in weakly acidic water to $\text{CH}_3\text{CHO} + \text{EtOH}$. Under the same conditions, Et-O-Et does not react. It appears that $\text{CH}_3\text{CH}_2\text{-O-CH=CH}_2$ reacts 10¹³ times as fast at $\text{CH}_3\text{CH}_2\text{-O-CH}_2\text{CH}_3$. This suggests that EtO-CH=CH_2 reacts by an unusual mechanism. When the hydrolysis is carried out in $\text{D}_2\text{O}/\text{D}_3\text{O}^+$, one of the reaction products is CDH_2CHO . What is the mechanism of hydrolysis of $\text{CH}_3\text{CH}_2\text{-O-CH=CH}_2$?

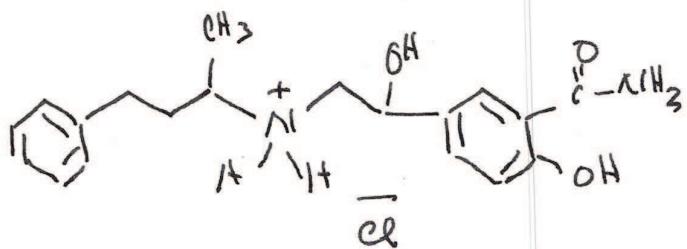


EtOH is acceptable
too

6. (10 pts) A pharmaceutical called labetalol is used to control blood pressure. It is sold as a chloride salt with the following structure.

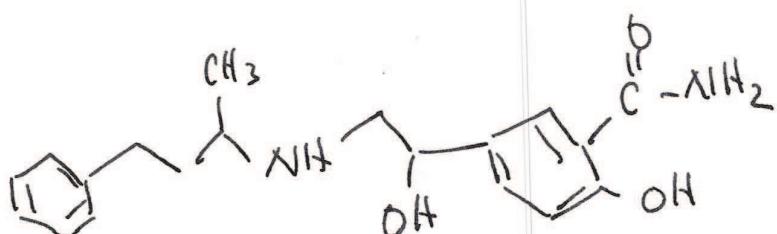


a) What is the exact structure of the chloride salt?

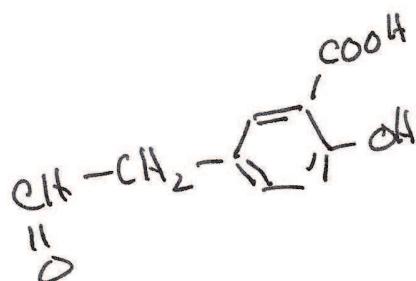
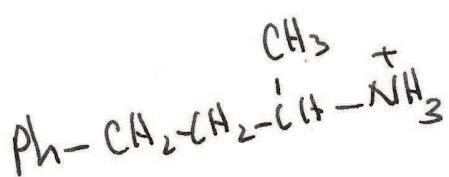
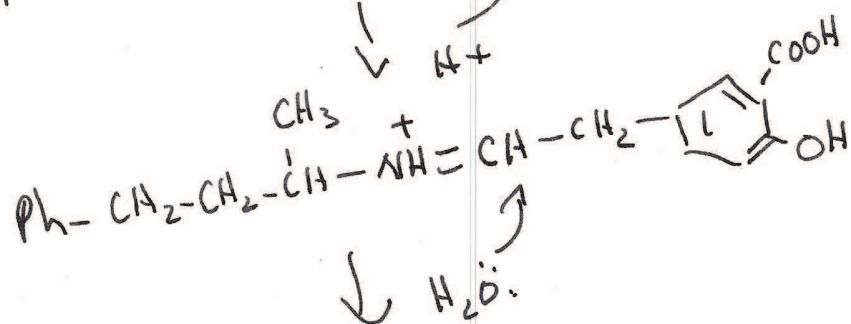
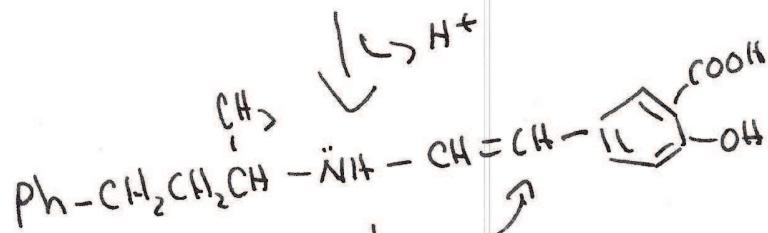
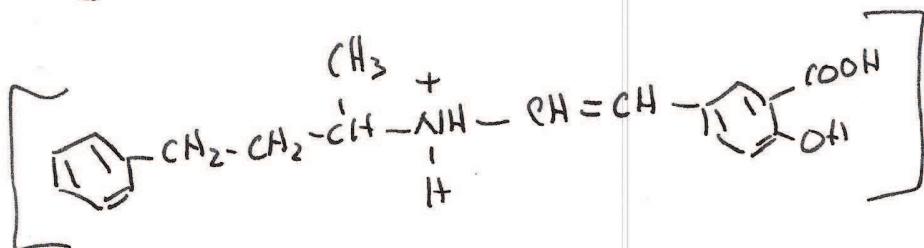
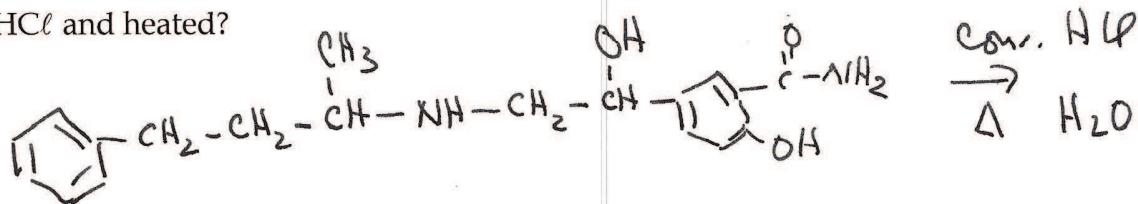


b) What happens to labetalol•HCl when it is treated with 1 equivalent of NaOH at room temperature?

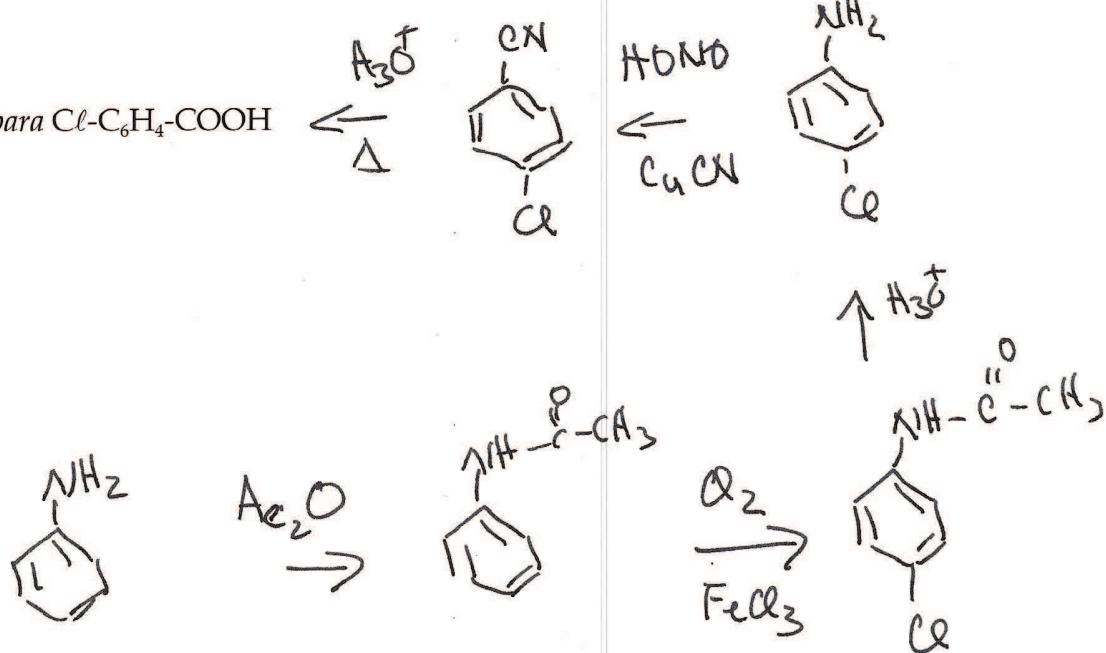
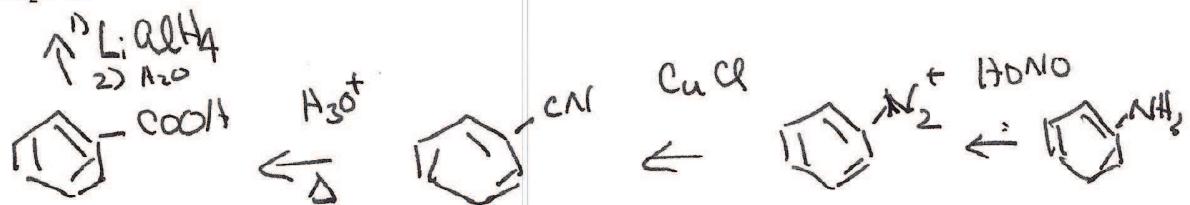
1 eq. NaOH



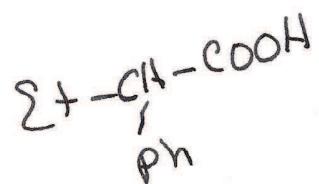
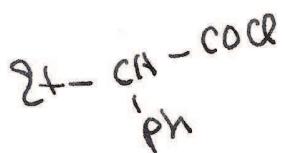
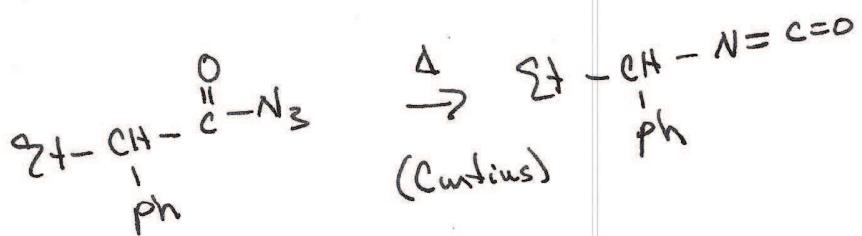
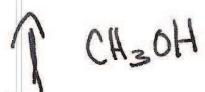
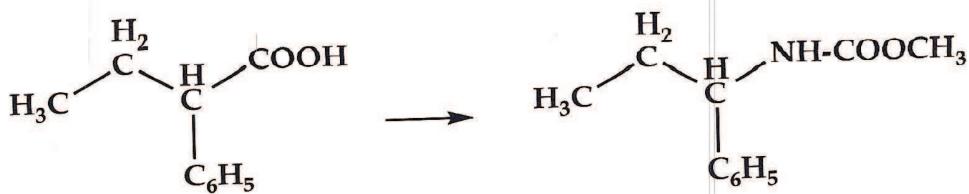
- c) What are the products formed when labetalol is treated with 6 M aqueous HCl and heated?

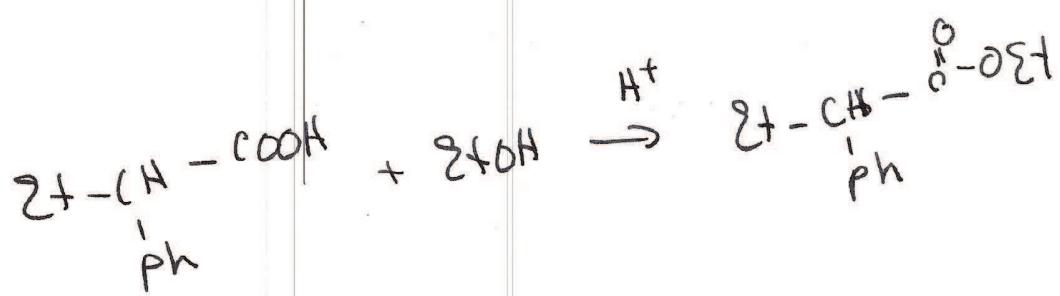
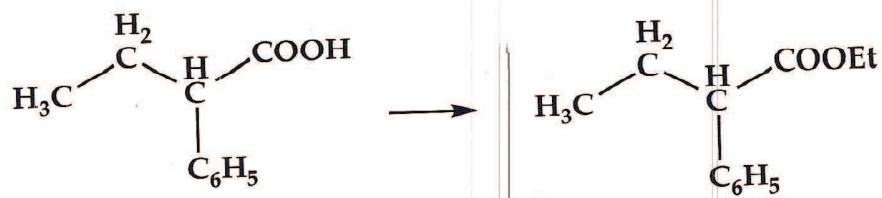


7. (10 pts) Outline a sequence of reactions that will convert aniline ($C_6H_5NH_2$) to:



8. (10 pts) Carry out the following transformations.





9. (10 pts) What is the mechanism for this reaction? This is tricky; the amine adds to the ester to start the reaction.

