

## **Exam #2**

### **Chemistry 334**

### **Organic Chemistry II**

**Thursday April 1, 2010**

Name: \_\_\_\_\_ **KEY** \_\_\_\_\_.

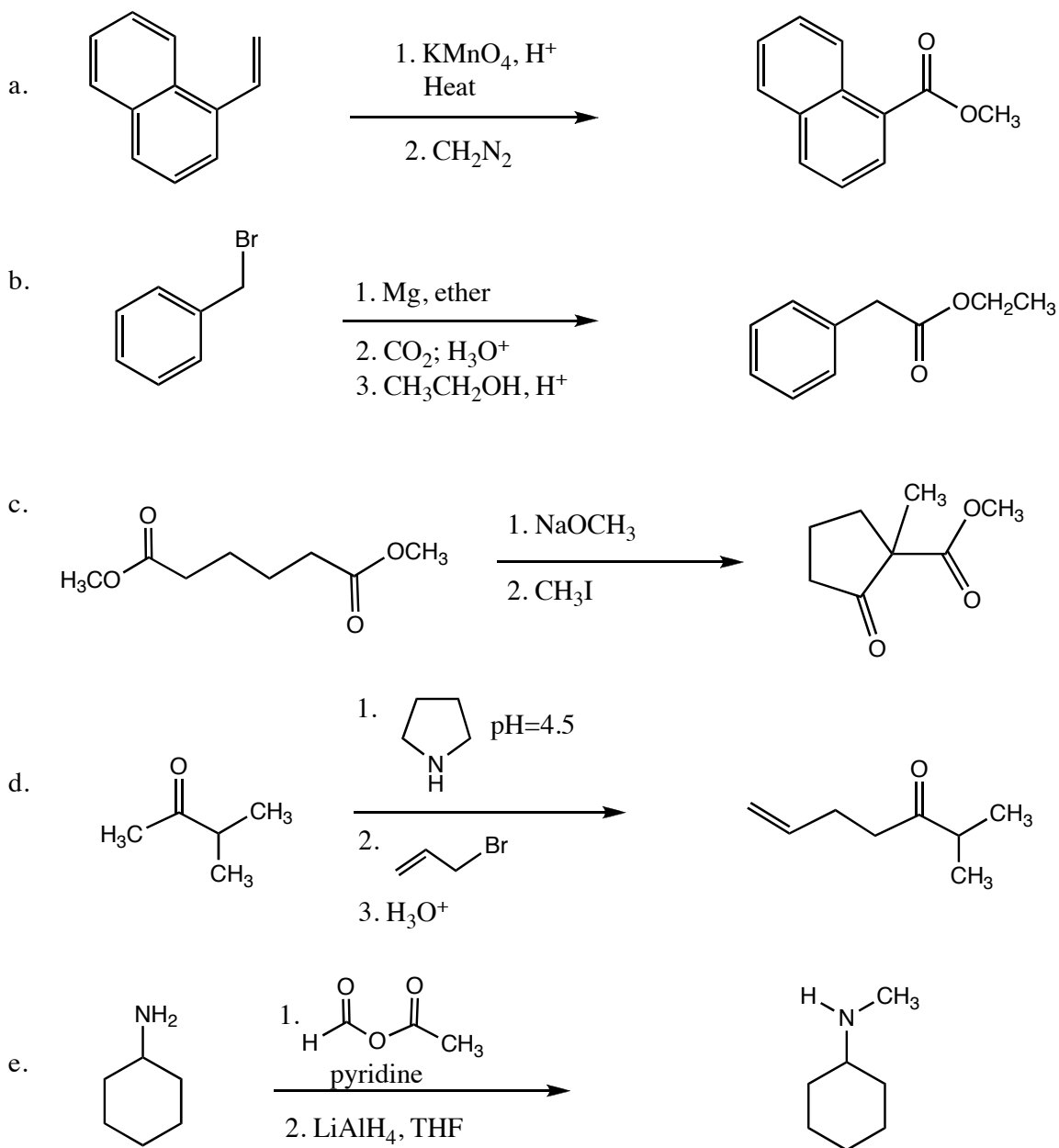
**The exam is worth a total of 100 points; there are five questions. Please show all work to receive full credit for an answer.**

**By putting your name on this exam, you agree to abide by California State University, Northridge policies of academic honesty and integrity**

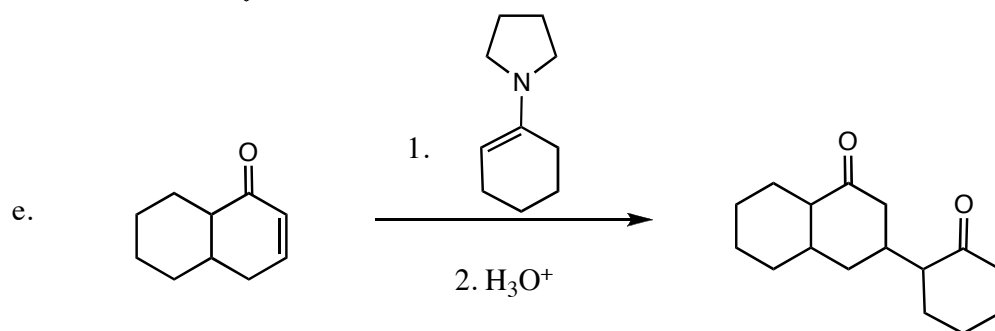
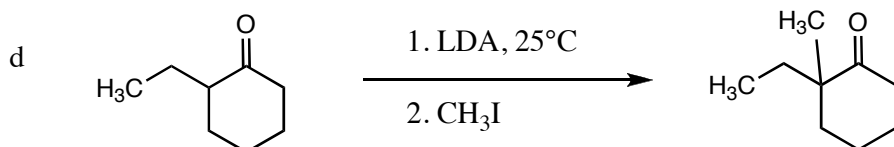
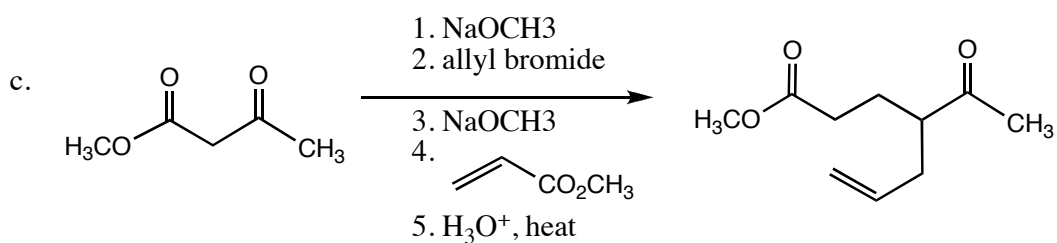
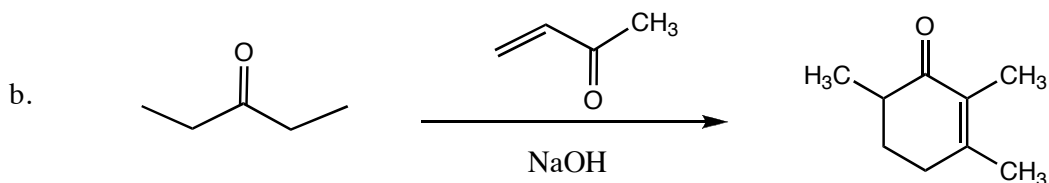
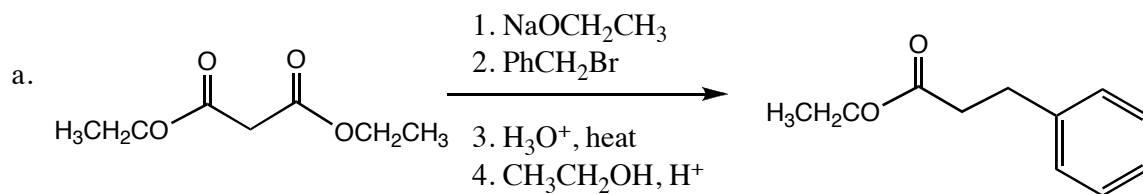
**Molecular models are allowed for this exam. Calculators are not needed.**

**Good Luck!**

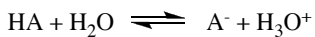
1. Predict the product(s) of the following reactions, noting stereochemistry where appropriate and indicating when a racemic mixture of enantiomers is formed: (4 pts. each)



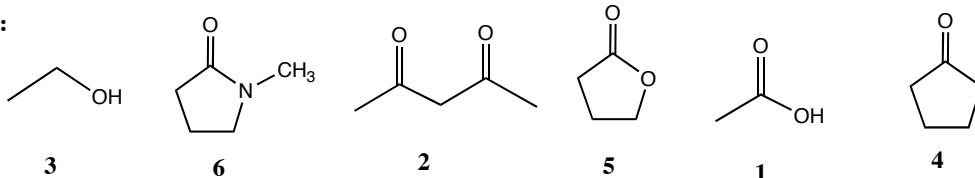
2. Indicate reagents to accomplish the following transformations. More than one step may be required in each case. (20 pts)



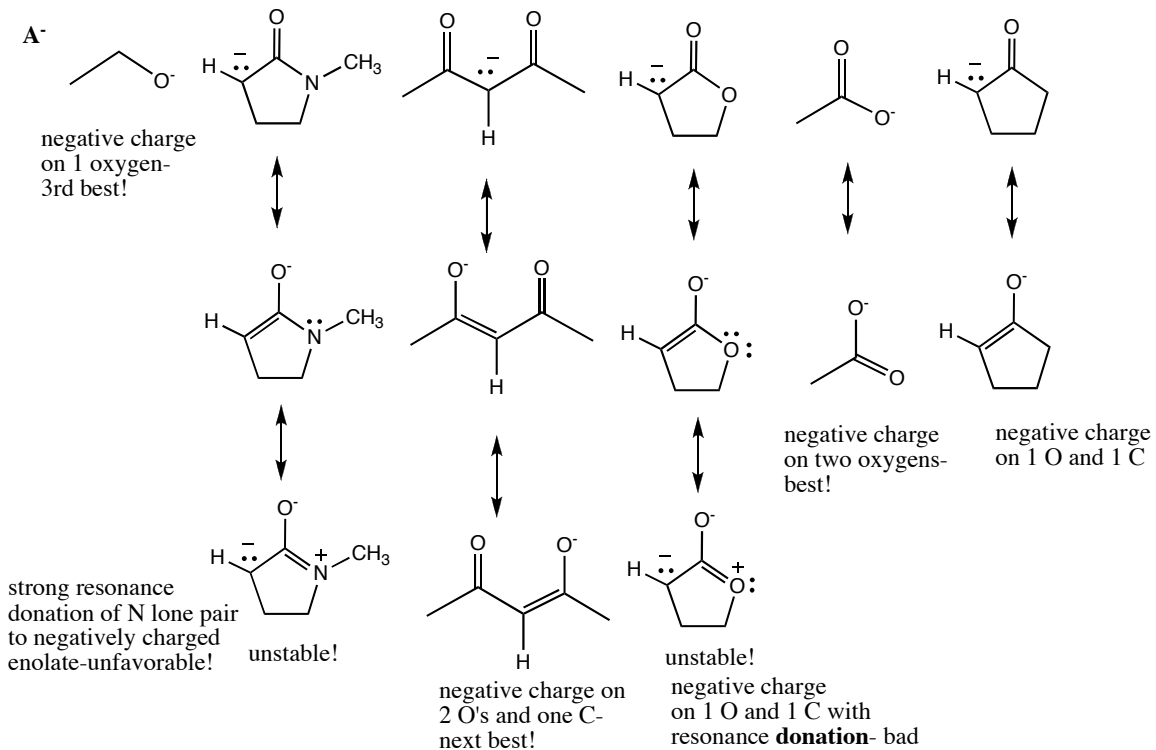
3. Rank the following compounds in terms of their acidity from least (6) to greatest (1), being sure to draw their conjugate base forms **and** including resonance forms of the conjugate base forms to explain your ranking . (20 points)



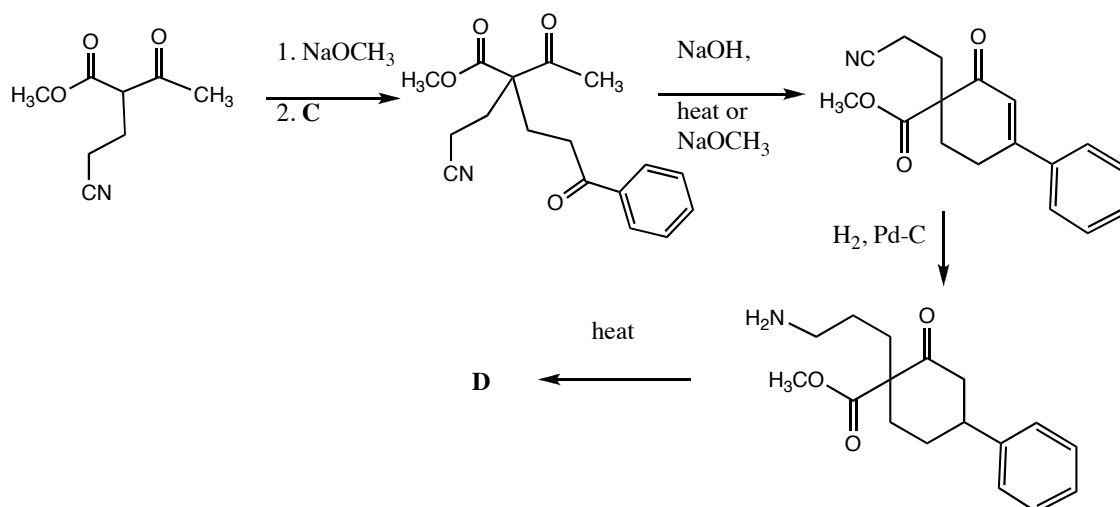
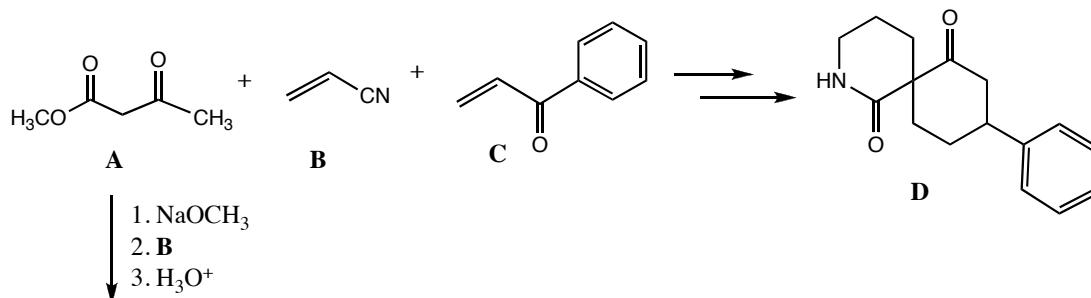
HA:



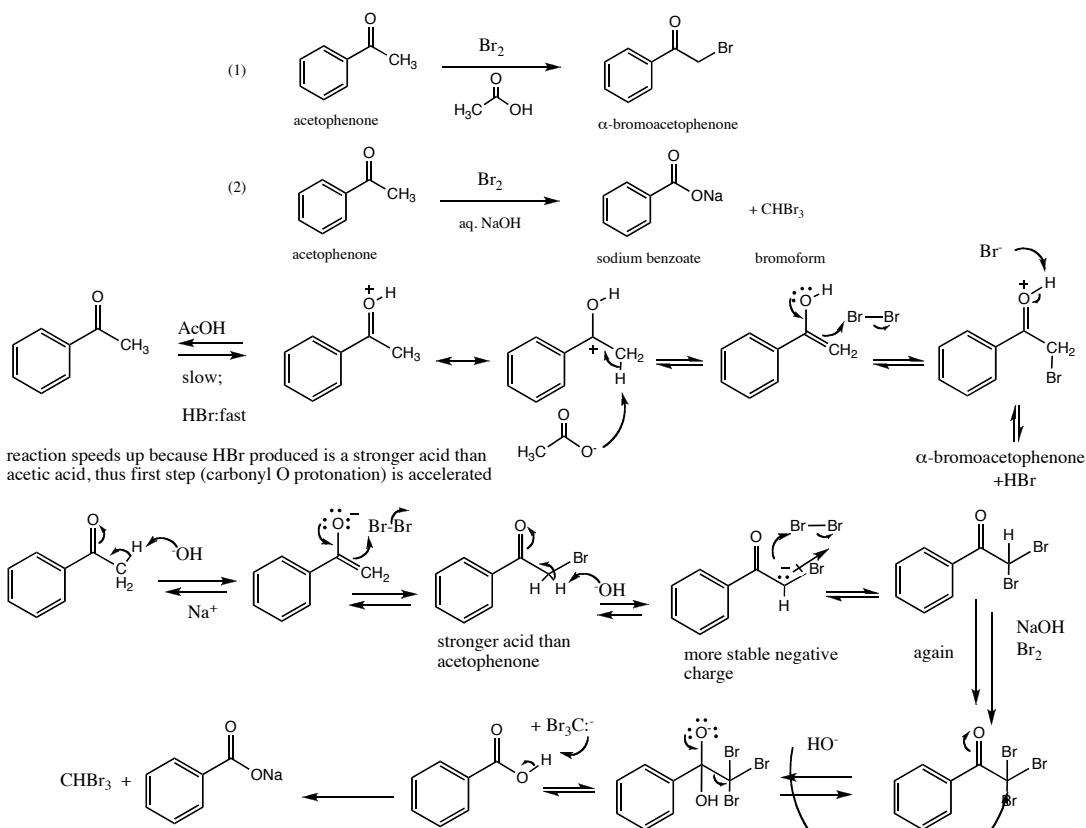
A<sup>-</sup>



4. Indicate a sequence of synthetic steps to prepare lactam **D** from **A**, **B**, and **C**. Only four-five steps are required! Useful reagents:  $\text{NaOCH}_3$ ,  $\text{H}_3\text{O}^+$ ,  $\text{H}_2$  / Pd-C, heat,  $\text{NaOH}$ . (20 points)

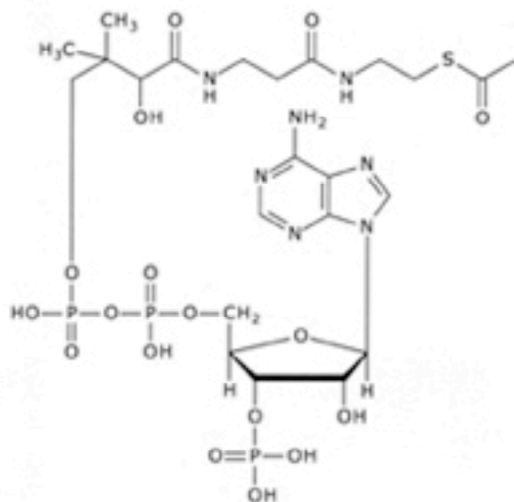


5. Acid-promoted bromination of acetophenone leads to  $\alpha$ -bromo acetophenone in high yields; NaOH-promoted bromination of acetophenone gives rise instead to sodium benzoate and bromoform. Using the curved arrow notation, draw a mechanism for both of these transformations, being sure to include all lone pairs, and formal charges. Suggest reasons why different products are formed under the different reaction conditions, and provide an explanation as to why the rate of reaction (1) increases as it reaches completion. (20 points)



overbromination is observed in basic conditions because the product alpha-bromoketones are more acidic than the starting materials; thus the tribromoketone is formed, and since  $\text{CBr}_3$  is a good leaving group, it can be displaced by hydroxide ion. Only monobromination is observed under acidic conditions because the rate determining step is carbonyl protonation; protonation of the alpha-bromo ketone is disfavored (relative to acetophenone) on electronic grounds due to the electron-withdrawing nature of the bromine atom.

6. (Bonus) Explain how acetyl coenzyme A transfers an acetyl group ( $\text{CH}_3\text{C}=\text{O}$ ) to amine nucleophiles and why the thioester functional group is ideally employed by nature to accomplish this task (versus an anhydride or an ester).(10 points)



acetyl Coenzyme-A

Congratulations!

Score:

1. \_\_\_\_\_/20

2. \_\_\_\_\_/20

3. \_\_\_\_\_/20

4. \_\_\_\_\_/20

5. \_\_\_\_\_/20

Bonus. \_\_\_\_\_/10

Total: \_\_\_\_\_/100