

Organic Chemistry c3444y

3rd Hour Exam

Monday, Apr. 26, 1999

Prof. Leighton

Name: _____ ID# _____

Signature: _____

- Write your name on every page.
- The exam is 5 pages long (*not* including this one). Please make sure you have all of the pages.
- Stay calm, and write complete but succinct answers. **Good Luck!**

Question 1 (20 pts): _____

Question 2 (20 pts): _____

Question 3 (20 pts): _____

Question 4 (20 pts): _____

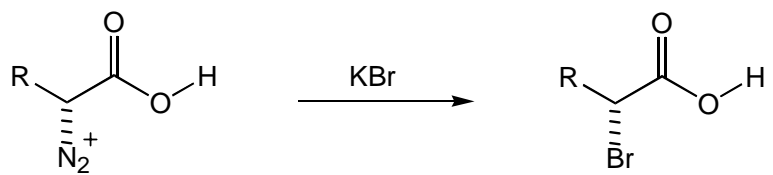
Question 5 (20 pts): _____

Total (100 pts): _____

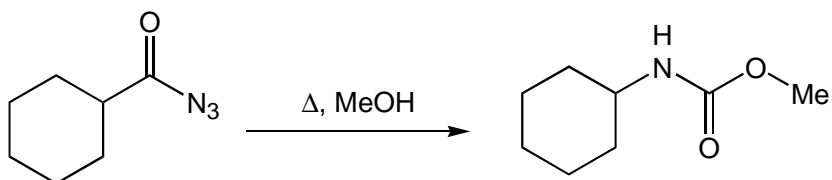
Name: _____

1. Provide detailed mechanisms for the following transformations:

a. (10 pts)



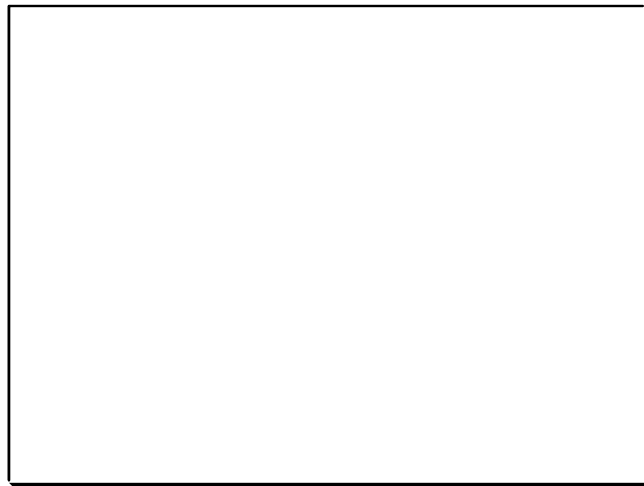
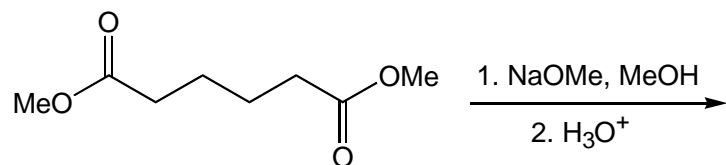
b. (10 pts)



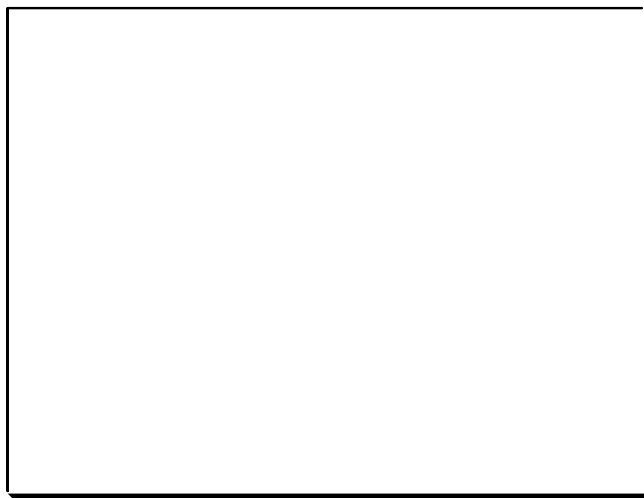
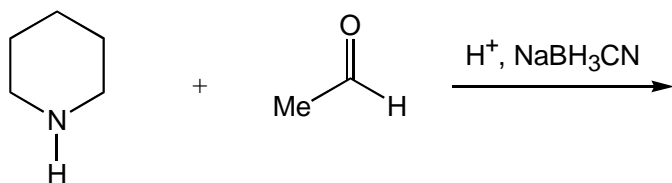
Name: _____

2. Predict the major product of the following reactions:

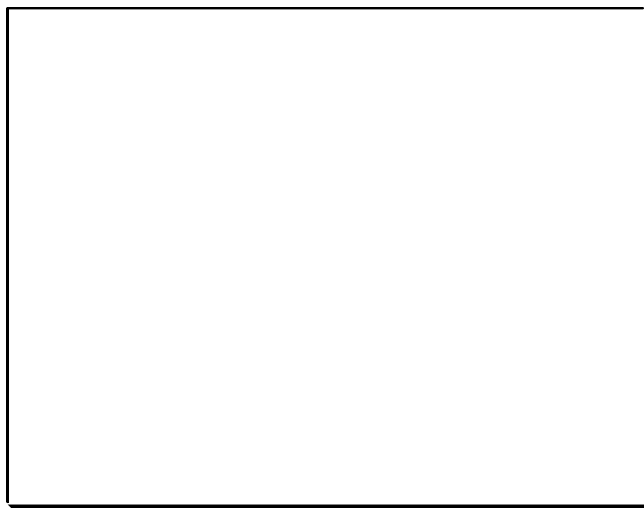
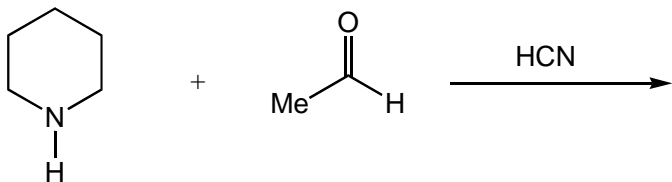
a. (10 pts)



b. (5 pts)

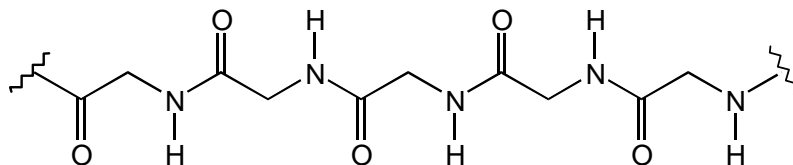


c. (5 pts)

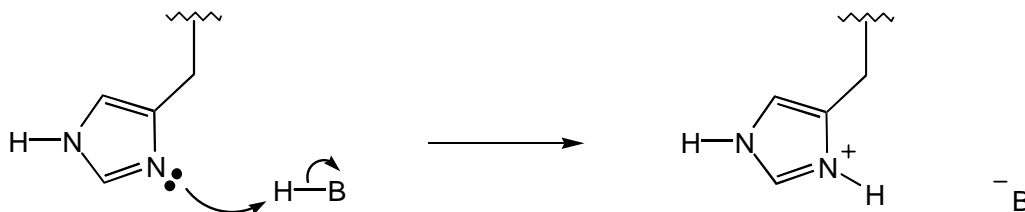


Name: _____

3. a. (10 pts) Shown below is a section of a peptide chain. Draw a second peptide chain underneath it such that you form an antiparallel β -sheet. Be sure to indicate the hydrogen bonds.



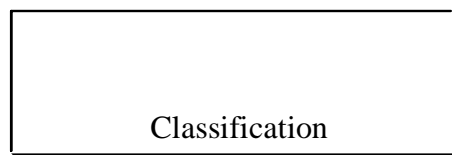
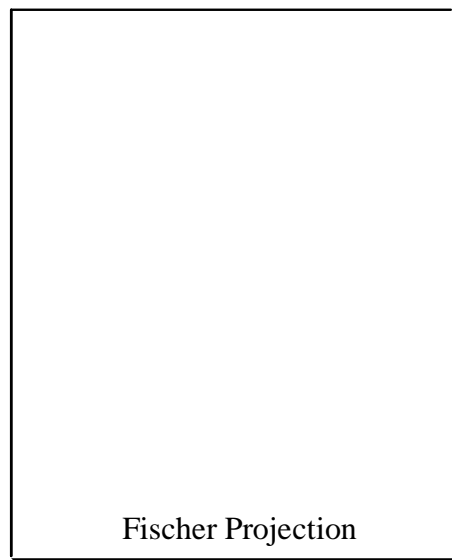
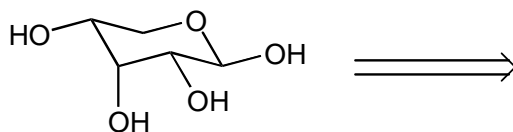
- b. (10 pts) The imidazole of histidine is often used by proteins as a base at the active site.



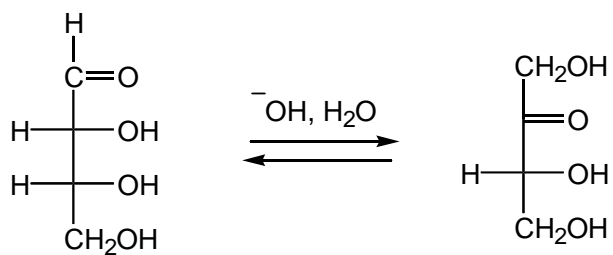
Although imidazole is a reasonably competent base (pK_a of protonated imidazole = 7), proteins often use a "trick" to increase its basicity. Show with structures how the basicity of imidazole may be increased. You may use any other reasonable chemical entity likely to be found in a protein that you desire.

Name: _____

4. a. (10 pts) Provide a classification (*e.g.* D-ketotriose) and a Fischer projection for the following carbohydrate:

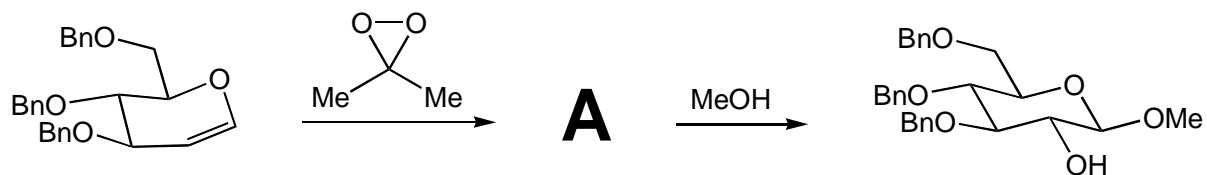


- b. (10 pts) Provide a mechanism for the following transformation:

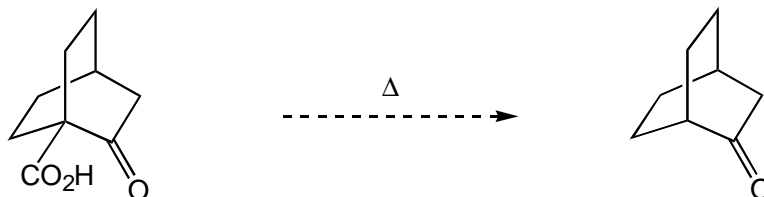


Name: _____

5. a. (10 pts) Provide the structure of intermediate **A**, and provide a *brief, concise* explanation for why this two step process leads to the indicated stereochemistry in the product.



- b. (10 pts) Because most β -ketoacids readily decarboxylate, your lab partner is planning to attempt the following decarboxylation:



Even though your lab partner routinely steals your food, you decide to explain why you believe this reaction might not work based on a careful mechanistic analysis: