

Chemistry 117 Sec. 1 (7:50-8:50)
Exam No. 4
“Enolate Chemistry, Oxidation & Reduction, and Carbohydrates”
April 25, 2005

Instructions: You will have 60 min. to complete the exam. At the 60 min. mark, I will request that all remaining test takers cease writing, turn their exams over, and pass them to their rightmost isle. If you finish within 55 min. you may turn in the exam at the front of the room prior to leaving. If you finish in the final 5 min. of class, please turn your exam over and remain seated until I call for the remaining exams to be turned in. *In fairness to all, anyone still working on the exam after “time” is called will receive a grade of zero!*

Be sure to read the instructions for each question. It may be helpful to skim the entire exam and solve the easier questions first.

Exam Agreement: I, _____, have read and agree
(Please print)

to abide by the instructions above. On my honor, I have neither given nor accepted any help during this exam.

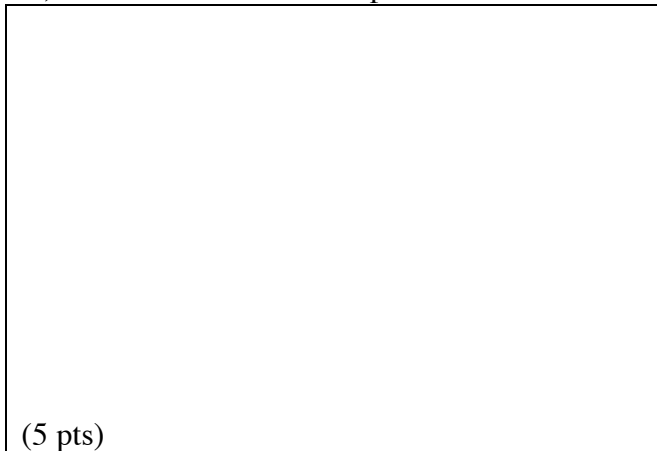
Signature: _____

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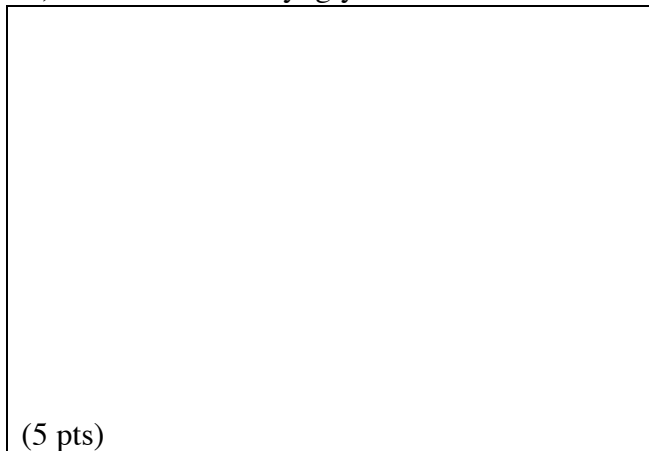
**DO NOT OPEN THIS EXAM UNTIL
INSTRUCTED TO DO SO**

1. Provide answers to the following statements or questions. Use chair drawings, Fischer projections, or Haworth projections where appropriate. Some commonly encountered sugars are provided for you on the last page of this test. Place your answers in the spaces provided.

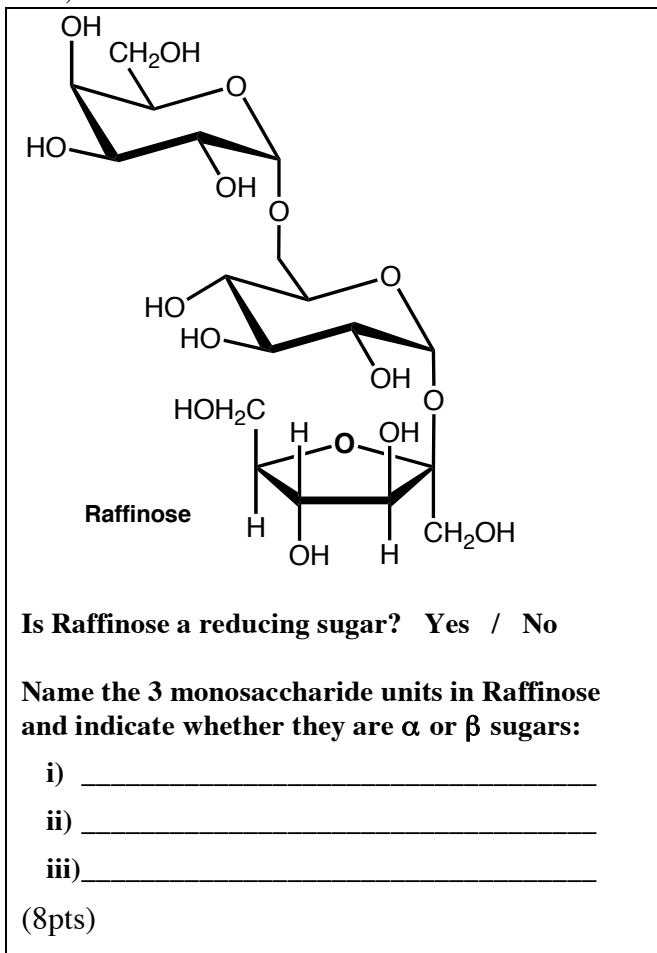
A) Draw & name the C-5 epimer of *D*-Idose?



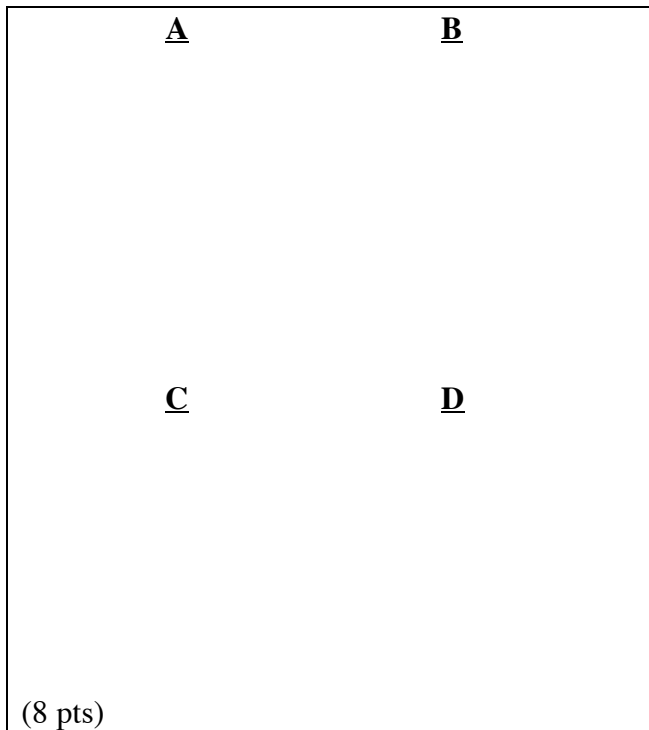
C) Draw the α -methyl glycoside of sorbose



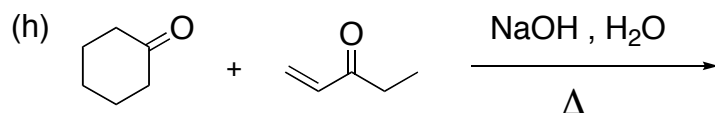
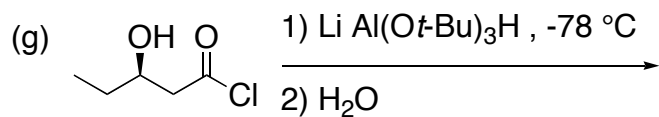
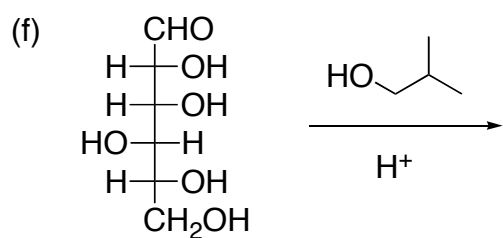
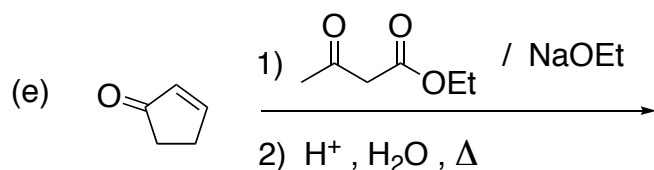
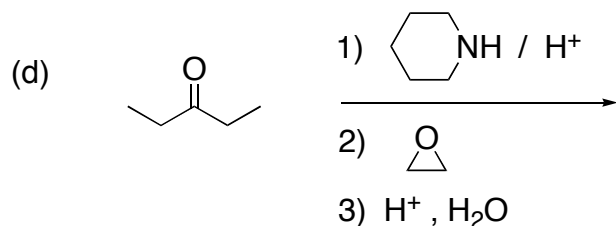
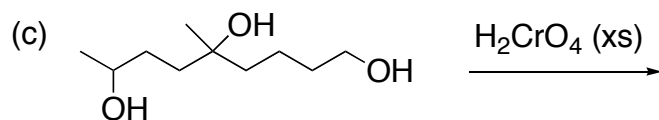
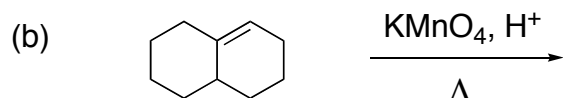
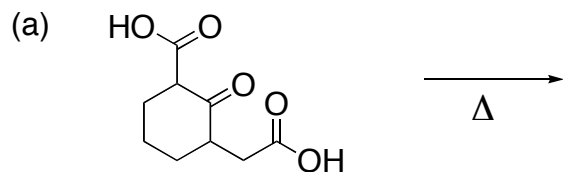
B) Answer these questions concerning Raffinose, a trisaccharide found in cottonseed meal.



D) **A** and **B** are optically active open-chain carbohydrates with molecular formula $C_6H_{12}O_6$. When **A** is subjected to $NaBH_4/EtOH$, it gives one compound, **C**, that rotates plane polarized light. When **B** is reacted with $NaBH_4/EtOH$, it gives two compounds **C** and **D**. **D** does not rotate plane polarized light. Provide structures for **A** - **D** that fit these criteria.



2. Predict the product(s) of the following reactions. Circle the *major product* in each case. (40 points)

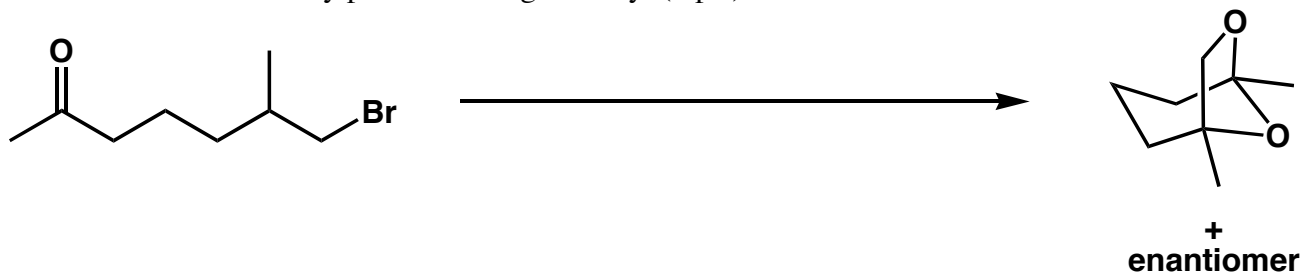


Robinson Annulation Product

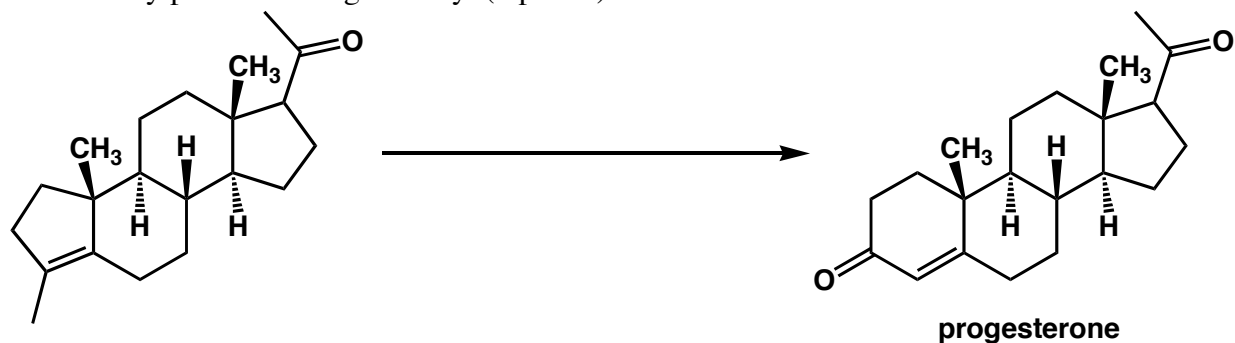
3. The acyclic form of *D*-fructose is a reducing sugar even though its structure does not have the correct functionality to react with the Tollens reagent. Apparently, under the basic conditions of the Tollens test, fructose is converted into two products that can react with the Tollens reagent. Provide structures for these two products and provide a *complete* mechanism for their formation. (12 pts)



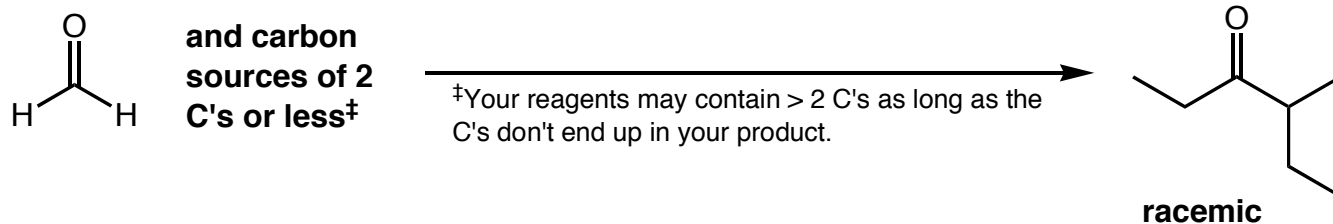
4. Frontalin is a pheromone of the Douglas Fir bark beetle & is used to control the population of these pests. Provide a synthesis of frontalin starting from the bromoketone shown. For full credit, be sure to draw all intermediary products along the way. (8 pts)



5. Progesterone is an estrogen steroid that is involved in the female reproductive cycle. Provide a synthesis for progesterone starting from the molecule shown. For full credit, be sure to draw all intermediary products along the way. (5 points)



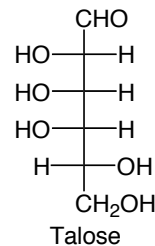
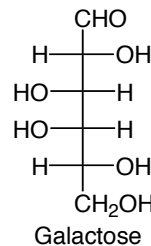
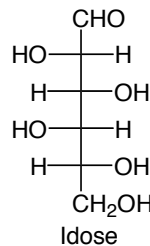
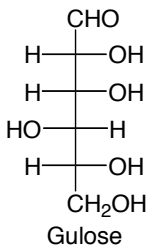
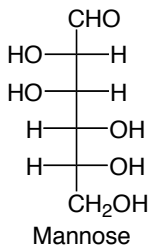
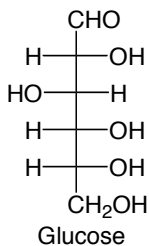
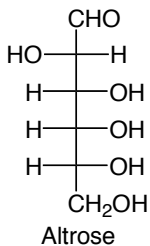
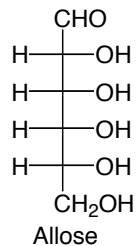
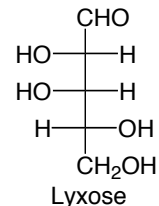
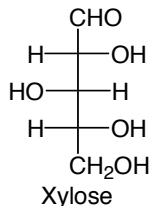
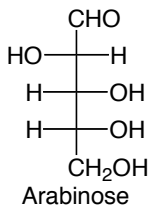
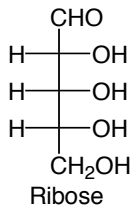
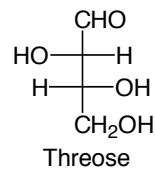
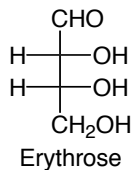
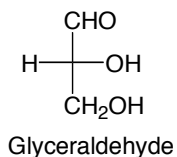
6. Provide a synthesis for the following transformation. For full credit, be sure to draw all intermediary products along the way. (9 points)



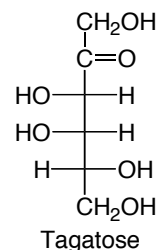
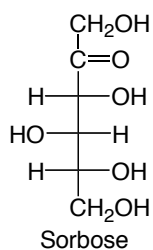
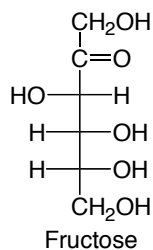
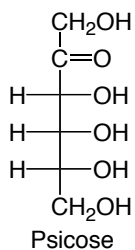
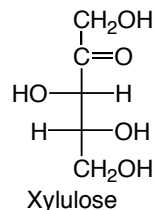
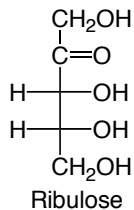
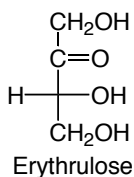
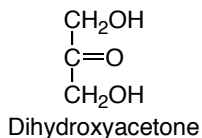
Grading Summary

Page	Point Value	Points Earned
1	26	
2	40	
3	20	
4	14	
	Total Score =	

The D-Series of Aldoses



The D-Series of Ketoses



Scratch Paper