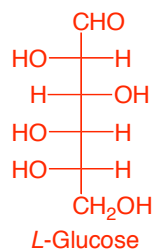


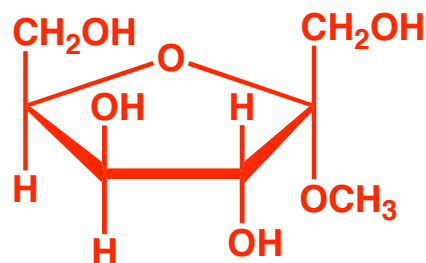
1. Provide answers to the following statements or questions. Use chair drawings, Fischer projections, or Haworth projections where appropriate. Some commonly encountered sugars are provided for you on the last page of this test. Place your answers in the spaces provided.

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



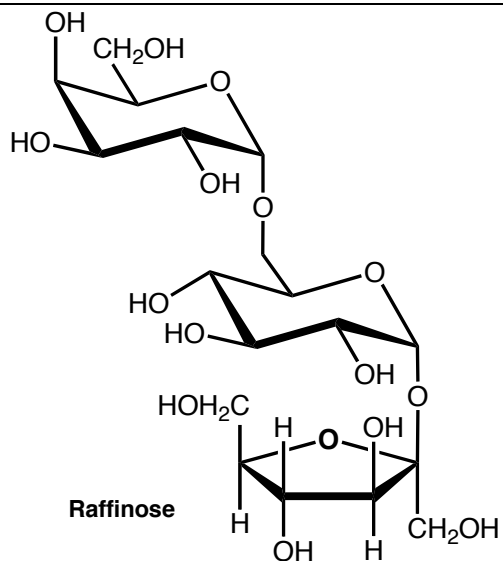
(5 pts)

C) Draw the α -methyl glycoside of sorbose



(5 pts)

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



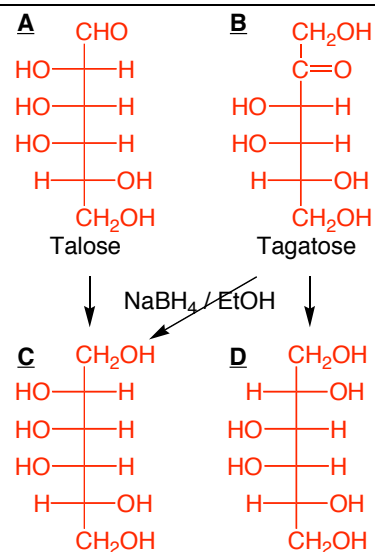
Is Raffinose a reducing sugar? Yes / No

Name the 3 monosaccharide units in Raffinose and indicate whether they are α or β sugars:

- i) α -Galactose
- ii) α -Glucose
- iii) β -Fructose

(8pts)

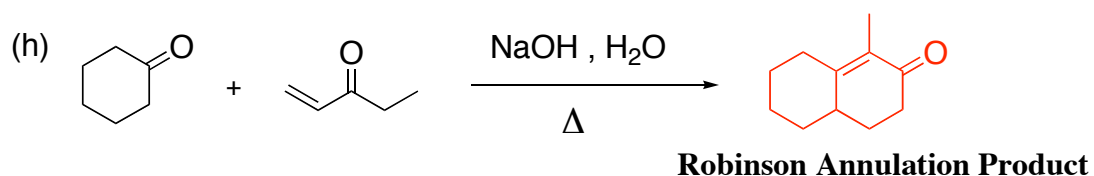
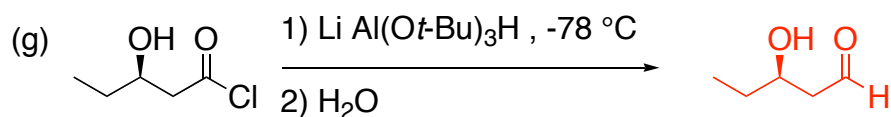
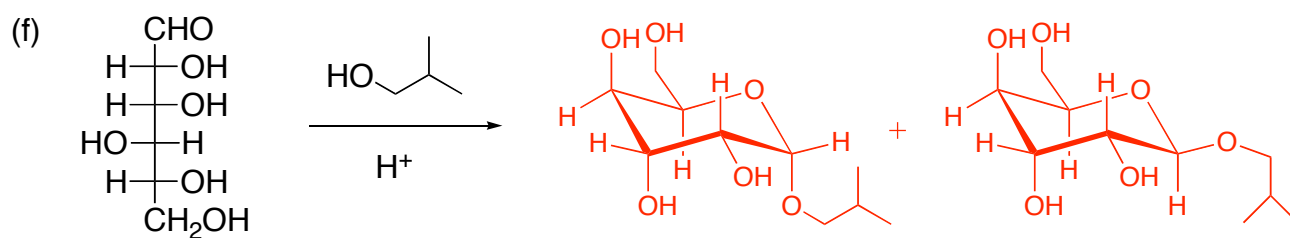
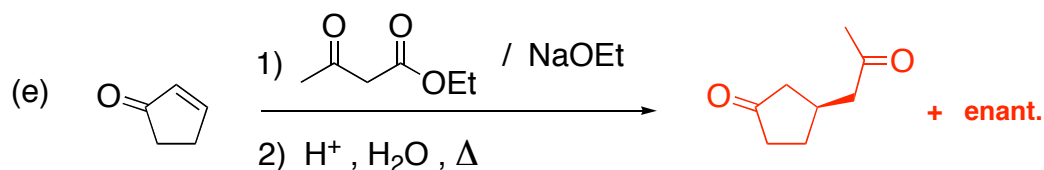
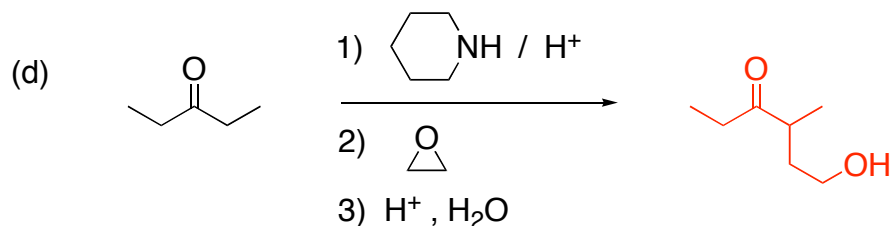
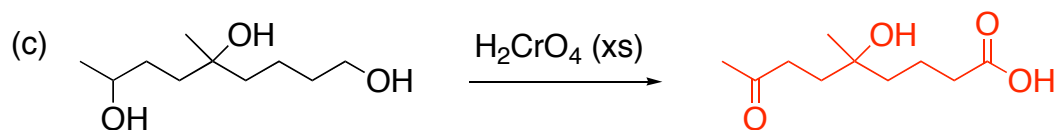
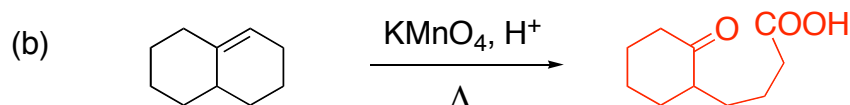
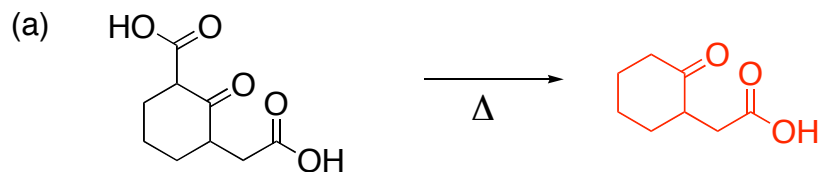
D) **A** and **B** are optically active open-chain carbohydrates with molecular formula $C_6H_{12}O_6$. When **A** is subjected to $NaBH_4/EtOH$, it gives one compound, **C**, that rotates plane polarized light. When **B** is reacted with $NaBH_4/EtOH$, it gives two compounds **C** and **D**. **D** does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



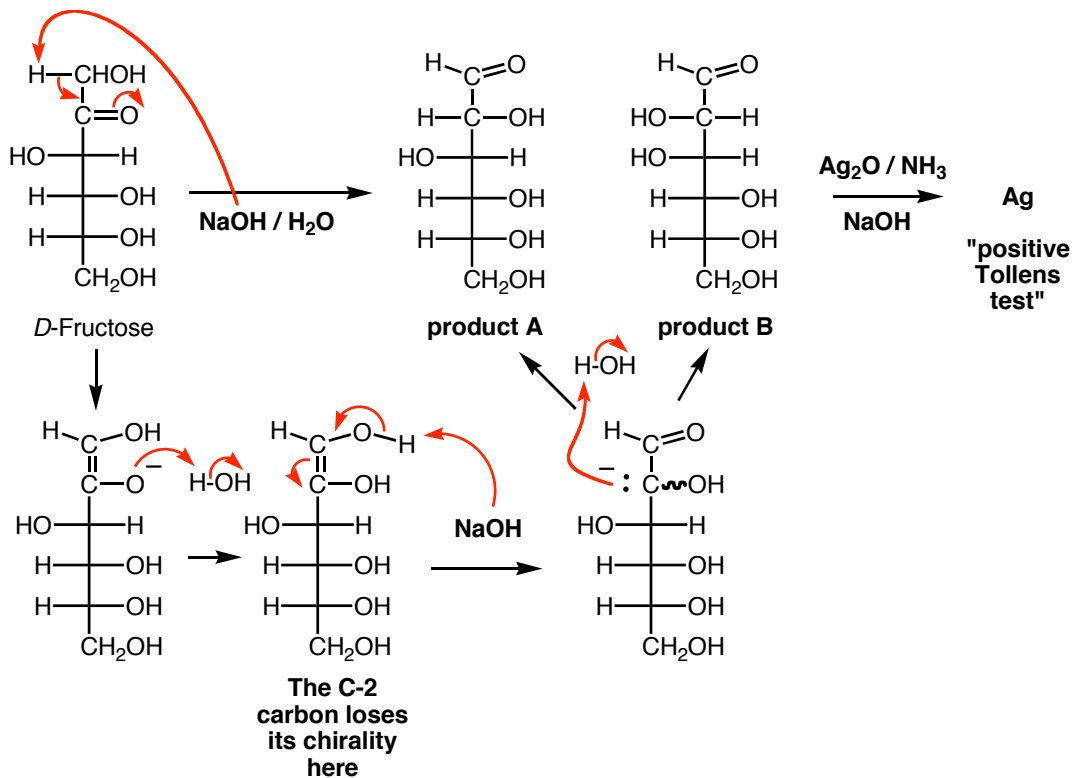
A can also be Altrose with **B** being Psicose.

(8 pts)

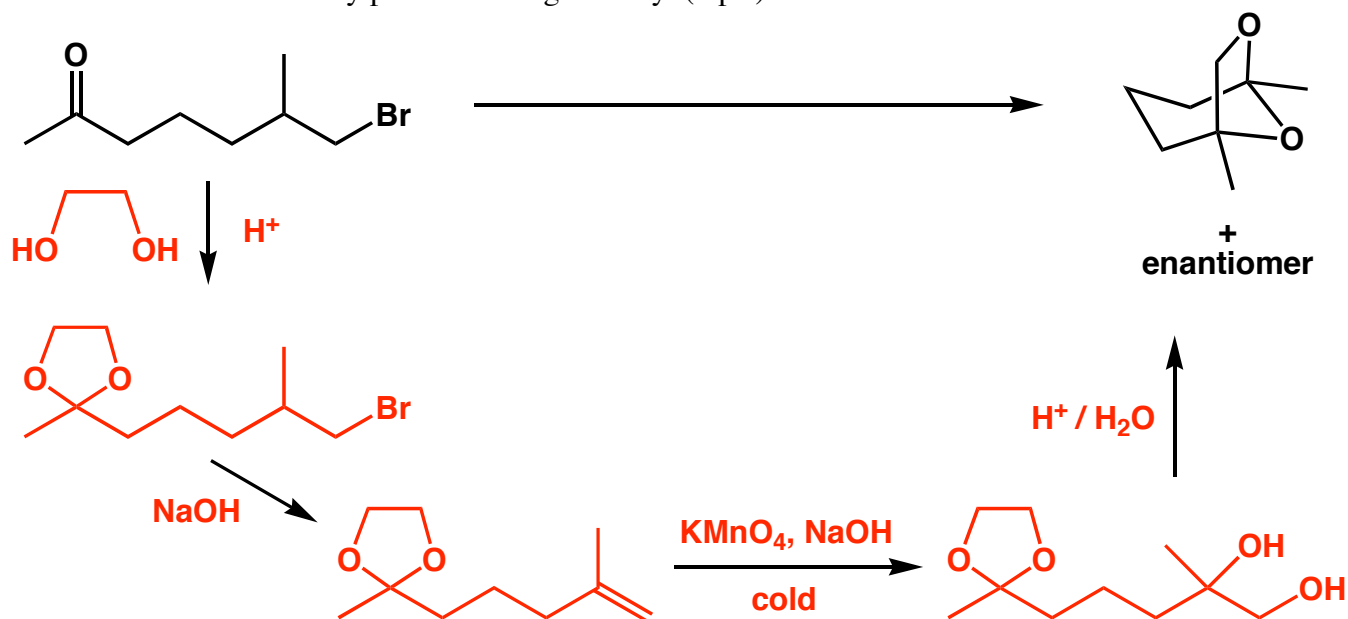
2. Predict the product(s) of the following reactions. Circle the *major product* in each case. (40 points)



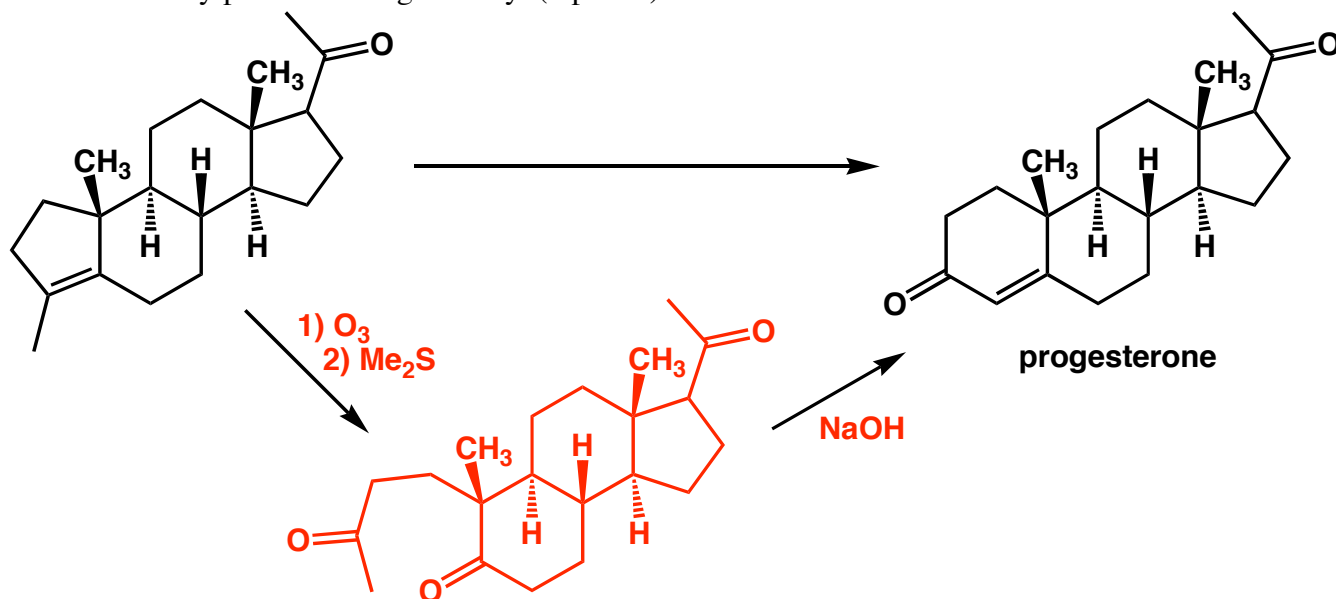
3. The acyclic form of *D*-fructose is a reducing sugar even though its structure does not have the correct functionality to react with the Tollens reagent. Apparently, under the basic conditions of the Tollens test, fructose is converted into two products that can react with the Tollens reagent. Provide 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)

