1. Which of the following compounds represents the hemiacetal form of the following open chain monosaccharide?

![Chemical structure](image)

2. Which of the following sugars undergo mutarotation in neutral aqueous solution?

![Sugar structures](image)
a. i and iii  
b. iii and iv  
c. ii, iii and iv  
d. i and iv  
e. i, ii and v
3. Predict the structure(s) when β-D-glucose reacts with methanol under acidic conditions.

\[
\text{CH}_3\text{OH} \quad \text{HCl} \\
\text{?}
\]

\[\begin{array}{ccc}
\text{i} & \text{ii} & \text{iii} \\
\text{iv} & \text{v}
\end{array}\]

a. i 
b. i and ii 
c. iii 
d. iii and iv 
e. v

4. Use this chart to help you solve the following problem as well as problem 5.

Give the name of the C-2 epimer of D-arabinose. Your answer should contain capital D or L, followed by a dash, and the name in lowercase letters (no space in between).
5. Choose the correct structure of α-D-xylose.

![Structures A to E]

6. Use this chart to help you solve the following problem as well as problem 7.

![Diagram of sugars]

Give the name of the C-5 epimer of D-glucose. Your answer should contain capital D or L, followed by a dash, and the name in lowercase letters (no space in between).

7. What is the name of the following aldohexose?

![Diagram of aldohexose]

a. β-L-altrose  
b. β-D-galactose  
c. α-L-altrose  
d. β-L-galactose  
e. α-D-talose
8. Choose the two D-aldohexoses (shown below) that give the same D-aldopentose when subjected to Ruff degradation (removal of C1 along with the conversion of C2 to an aldehyde).

![Chemical structures of D-allose, D-glucose, D-gulose, D-galactose, D-mannose, and D-talose]

- a. D-glucose and D-mannose
- b. D-allose and D-glucose
- c. D-gulose and D-galactose
- d. D-mannose and D-talose
- e. D-glucose and D-gulose

9. Which of the following compounds represents the hemiacetal form of the following open chain ketose?

![Chemical structure of an open chain ketose]

![Hemiacetal forms A, B, C, D, and E]
10. Complete the following synthesis by selecting from the list of 10 reagents below. Each reagent (or set of reagents) is labeled as a letter. In the answer box, simply place the order of reagents used as uppercase letters. For example, if your synthesis involves using reagent A followed by B, followed by C, and then D, your answer would be: ABCD.