1. (15) Nomenclature: Provide the full IUPAC name of the molecule pictured below:

Name: _______________________________________________________________________

2. (18) Structure Exploration: Answer the questions concerning the following carbohydrate:

   a) This disaccharide is a(n) __________________________. Circle ALL that apply.
      acetal    ketal    hemiacetal    pyranose    furanose    ketose
      aldose    hexose    heptose    reducing sugar

   b) Ring “a” is __________________. Circle ALL that apply.
      galactose    glucose    ribose    alpha anomer    beta anomer

   c) Ring “b” __________________. Circle ALL that apply.
      galactose    glucose    ribose    alpha anomer    beta anomer

   d) In the space below, provide the full name of the disaccharide:

      Name: _______________________________________________________________________

   e) Could dogs digest this disaccharide? ___________________________________________

   f) If there are any mutarotatory carbons, but a star (*) next to them on the structure above.
3. (27) D-Idose is identical to L-Glucose, except that one stereocenter is different. Solve the following problems about D-Idose.

(a) Draw the Fisher projection of D-Idose

(b) Complete the following drawing of D-Idose by filling in any missing atoms using dashes and wedges as necessary.

(c) Draw the α-D-idopyranose form of this carbohydrate in the space below. Your structure must be represented in the Haworth projection.
4. **Mechanism**: Show the complete mechanism for the transformation shown below.
5. (35) Predict the missing reagents, MAJOR product(s) or reactants in the spaces provided.
6. (25) Retrosynthetic analysis: Propose a synthesis for the following target molecule starting with the starting materials provided as your only sources of carbon. The forward synthesis is mandatory, and the retrosynthesis may earn significant partial credit.

\[
\begin{align*}
\text{OH} & \quad \text{+ CH}_3\text{I} \\
\text{N} \quad \text{C} & \quad \text{O} \\
\end{align*}
\]

\[
\text{many steps}
\]

Do not show any mechanisms.