1. (34) Answer the following questions about the carbohydrate below:

(a) (5) This carbohydrate is _____________________. Circle all that apply from the list:
- hexose
- ketose
- monosaccharide
- pentose
- pyranose
- tetrose
- triose
- furanose
- heptose
- polysaccharide
- disaccharide
- aldose

(b) (8) Draw the correct Fisher projection corresponding to the above structure:

(c) (8) Convert the acyclic Fisher projection from your answer in (b) to a cyclic Haworth projection with the ring closed into the alpha pyranose form.

(d) (8) Draw the MOST STABLE chair conformation corresponding to your answer in (b).

(e) (5) Circle the best answer. The carbohydrate at the top of the page is:   D   L
2. (16) Allose is a C-3 epimer of glucose. Draw a trisaccharide using HAWORTH projections that contains only D-allose. In your drawing, make sure that you use 1,3’ linkages that are NOT easily digested by mammals. If there are any mutarotatory carbons, put a star (*) next to each of them and draw them all in the α conformation.

5. (42) Mini-Roadmaps: In the boxes provided, draw the structure of the missing starting material or MAJOR organic product(s).

(a)

(b)

(c)
7. (28) **Mechanism**: Show the complete mechanism for the transformation shown below.

\[
\text{NaOH (aq)} \quad \text{heat}
\]
8. (30) 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. Do not show any mechanisms.