

Project 1: Goblet Design

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Instructions

Your project is to design the most visually appealing goblet that meets the following criteria:

- the goblet will be molded using a symmetric mold, i.e., the goblet must be a solid of revolution
- the goblet must hold between 237 and 266 cm³ (8–9 oz) of your favorite liquid
- the height of the center of mass must be no more than 3 times the base radius i.e., the goblet must be reasonably stable,
- thickness of the glass must be at least $\frac{1}{4}$ cm at its thinnest point
- the goblet can be made with no more than 200 cm³ of glass
- the function for the upper curve of the region must be a piecewise-defined function with at least three “pieces”, and at most one of the pieces can be a linear function. (Note that a constant function is a linear function.)

Your report should follow the guidelines set forth in the What is a Report Project? handout. In particular, your report should include the following:

- a complete description of the region to be revolved around the x -axis to construct the goblet
- a (2-D) plot of the region and a (3-D) plot of the goblet
- the amount of liquid that your goblet can hold and the amount of glass needed to make the goblet
- the minimum thickness of glass for your goblet
- the ratio of the height of the center of mass to the base radius

Remember

You need to email the Maple worksheet that creates the goblet to your lab TA.

Acknowledgement

- This project is based on a project created in the Department of Mathematics at Kenyon College.