

## Project: Goblet Design

Douglas Meade, Ronda Sanders, and Xian Wu  
Department of Mathematics

### *Preparation*

Be sure to read the *Project Report Guidelines* before beginning your project. Remember, you are to turn in a neat and complete project report typed in Microsoft Word (or a similar software). Any figures should have a title and a legend and be properly referenced in the report. A complete project report should include all necessary equations and information. **Your project and project report should be independent work. All instances of copying/plagiarism will be reported to the Office of Academic Integrity.**

### *Instructions*

You have been hired by a private company overseas to design the most visually appealing goblet that meets the following criteria:

- the goblet will be molded using a symmetric mold, that is, the goblet must be a solid of revolution;
- the goblet must hold between  $177 \text{ cm}^3$  and  $237 \text{ cm}^3$  (6-8 ounces) of liquid and use less than  $120 \text{ cm}^3$  of glass;
- the height of the center of mass must be less than 3 times the radius of the foot so the goblet will be reasonably stable;
- thickness of the glass must be at least 0.25 cm at its thinnest point.

Your report should follow the guidelines set forth in the *Project Report Guidelines* document on our lab web page. In particular, your report should include the following:

- a detailed description of your design. This should include the piecewise-defined function(s) used to create your goblet.
- a (2-D) plot of the region to be revolved and a (3-D) plot of the goblet
- detailed numerical results showing that the criteria are satisfied.
- use the scale that one unit on the  $x$  or  $y$ -axis is 1 cm

### *Acknowledgment*

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