

## Designing a Wine Goblet

(Project and Contest!)

Math 112

Fall 2010

Your task is to design a wine goblet that meets the following mathematical specifications:

1. It is a solid of revolution.
2. It holds at least  $150 \text{ cm}^3$  of liquid.
3. It takes no more than  $150 \text{ cm}^3$  of glass to manufacture.
4. The ratio of the height of its center of mass to the radius of its base is no more than 3:1.
5. The radius of its stem must be at least  $\frac{1}{4}$  cm at its thinnest point.

In order to qualify for the contest an entry must meet all the mathematical specifications given above. A qualifying entry for the contest will consist of a well written paper that clearly describes the function used to form the wine goblet (careful analytical descriptions and good graphical representations should both be included) and clearly proves that all the mathematical requirements are met. The paper should meet good standards of mathematical and English grammar in addition to being clear and well written.

The winner of the contest will then be chosen based on aesthetic considerations only. There is a prize for each designer of the first place goblet.

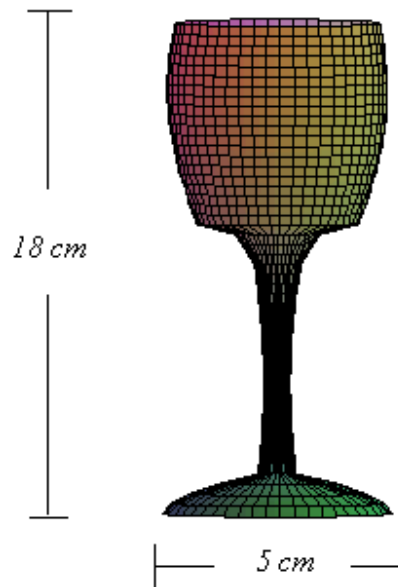
### Submitting the Goblet Project

When you turn in your goblet project you must include several things:

1. Turn in a well written paper in which you present the goblet (giving the complete mathematical description of the functions involved in defining it) and show all the mathematics required to verify that it has the required properties. You may do this in the guise of presenting the goblet as a proposal to a company that makes goblets, if you wish. In addition, the paper should include properly proportioned pictures of the cross section of the glass as well as of the three dimensional goblet.

2. A one page submission for the contest. This must include an upright picture of the goblet properly labeled with the dimensions of the goblet. (As shown on the next page.) If you wish, you may also include a second view of the goblet shown from any viewpoint you wish. ***This is the only part of the project that the judge will see.***

This project was created by Carol Schumacher.



3. You must submit a Maple file including just the piecewise defined functions that describe the outside and the inside of your goblet to the directory:

**P:\Class\Math\Smith\Math112Fa10.**

You should title the file with the username of one of the persons in your group. (This is to keep two groups from choosing the same name and one of you overwriting the other's goblet.) In other words, I would name my file *smith.mw* .

In the file you should also put the names of the person(s) who contributed to the project.

This project was created by Carol Schumacher.