The Beer Glass Project

You have been hired to design a pint glass for a new local brewery, Numbɛrs. Your group will write a formal report describing your design and explaining why Numbɛrs Brewery should select your glass. The design needs to be unique, but at the same time resemble existing beer glasses and be comfortable to drink out of. The beer glass must hold 16 ounces when filled to the rim.

The glass design will come from a curve that you determine. You'll then revolve the curve around a line, thus forming an inner surface of the beer glass. It will be easiest to let your curve be a function of x and then revolve the curve around the x-axis. This curve must have at least one point where the slope of the tangent line is 0, so that it is pleasing to look at as well as functional to hold, but it should not be 0 everywhere (that is, the glass should not be a cylinder).

Your report is not limited to, but must include:
- Title and names of group members
- A brief introduction on how you went about coming up with your design.
- The equation of your curve and an explanation of how you determined that equation.
- An explanation of how you know the glass holds 16 ounces.
- Assuming the glass is 1/8 inch thick (except for the bottom, which is 3/8 inches thick), determine how much glass it will take to make one of these glasses.
- Computer generated graphs of your original curve and the glass itself. You can go to http://math.exeter.edu/rparris/winplot.html to download a free version of Winplot. I recommend this tool because it is easy to graph a rotated curve with it (see instructions on the back of this sheet)
- A summary of why your design should be selected by Numbɛrs Brewery.

This project will represent 10% of your course grade. It will be graded on completeness and neatness, as well as accuracy. The project deadline is Wednesday, August 27th, the last day of class. I will give a 5% bonus for those turned in on Wednesday, August 20th, and a 3% bonus for those turned in on Monday, August 25th.

You should do this project in groups of 2 to 4 people to be considered for any bonus points and to minimize your workload. We will have time to work on this project during parts of a few days, but you will definitely need to schedule group time outside of class. The biggest mistake you could make on this project is procrastination! **Your report should not be hand written**, though you may neatly write your calculations by hand either within the body of the report or as well-labeled attachments (e.g., "For the calculation of the amount of glass needed, see Figure 4"). Or if you prefer, you may use Word's equation editor (see me if you need help).

Suggested Timeline:
End of week 6: Have an idea of how to determine an appropriate generating curve.
End of week 7: Have your design done.
End of week 8: Have an outline of your report done.
Week 9: Finish writing, proofread, double-check calculations. Compare report to the scoring rubric.

WinPlot Help

To get started:
- When you initially open up WinPlot, you'll see a blank greenish window that says "Window" and "Help" at the top.
- Go to the "Window" menu and choose "2-dim". That will open a new window with blank axes.

To graph your curve:
- Go to the "Equa" menu and choose "1. Explicit".
- Type in your function, hit the "lock interval" box, and choose the interval over which you want to define your function by picking a "low x" and "high x". Then hit "ok".
- If you want to edit your function, go back to the "Equa" menu and choose "Inventory".

To revolve your curve around the x-axis:
- Go to the "One" menu and choose "Revolve surface…".
- It should already be set up to revolve around the x-axis, but you can click the "x-axis" button to be sure.
- Adjust your "arc start" and "arc stop" so they match your "low x" and "high x" from the previous process.
- Your "angle start" and "angle stop" should already be set at 0 and 2π (about 6.28319), but verify that.
- Click "see surface". Note that this will only show the lateral surface of your glass, not the base, but that's fine for your report.