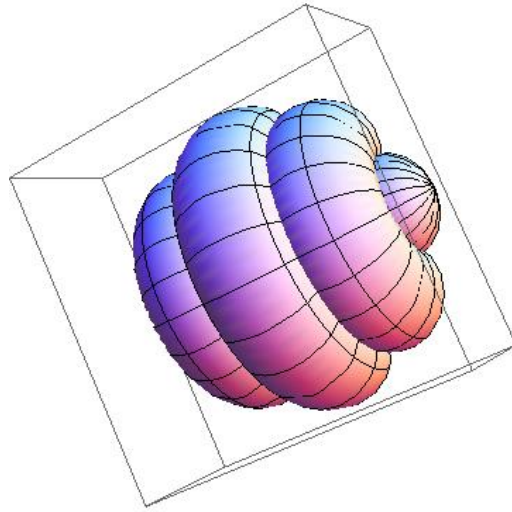


MATHEMATICA LAB I



SOLIDS OF REVOLUTION

(Lab report due: 10 February 2016)

Before beginning this lab, view the Mathematica tutorial [Hands-On Start](#) and carefully look at the *examples on our website*. Submit a printed version of your Mathematica notebook. You may work with other students and compare results, but ultimately you must submit *your own* lab results --- not a shared copy. On your front page (using Mathematica) state your name and “Mathematica Lab I” using an appropriate style, font, size and color. Make certain that your lab report is *stapled*.

1. Plot the sphere of radius 7 centered at the origin and compute its volume.
2. Plot a right-circular cone with base radius 5 and height 13 and compute its volume.
3. Rotate one arch of the curve $y = \sin^4 x$ about the x-axis and find its volume. Plot.
4. Suppose that the curve $y = 1/x^4$ is rotated about the x-axis from 1 to m . What happens to the volume of such a solid as m grows without bound? Explain! Plot!
(*Note:* In Mathematica, the `RevolutionPlot3D` command requires you to choose specific values for m .)

5. Consider the region \mathbb{R} bounded above by one arch of the cycloid: $x(t) = 3(t - \sin t)$, $y(t) = 3(1 - \cos t)$, $0 \leq t \leq 2\pi$, and below by the x -axis. Find the volume of the solid of revolution obtained by rotating \mathbb{R} about the y -axis. (Express your answer to the nearest tenth.) Plot!
6. A lab glass container can be modeled by revolving the graph of

$$f(x) = \begin{cases} \sqrt{0.1x^3 - 2.2x^2 + 10.9x + 22.2} & \text{if } 0 \leq x \leq 11.5 \\ 2.95 & \text{if } 11.5 < x \leq 15 \end{cases}$$

about the x -axis, where x and y are measured in centimeters. Plot the solid and compute its volume (to the nearest tenth). (*Note:* You will need to use the *Piecewise* command to define $f(x)$.)

"I could have done it in a much more complicated way," said the red Queen, immensely proud.

- Lewis Carroll



[COURSE HOME PAGE](#)

[DEPARTMENT HOME PAGE](#)

[LOYOLA HOME PAGE](#)