

## Cylindrical Shells

This particular 3D print was our first calculus print pulled from this [Thingiverse](#) post as an experiment to make sure we could print something. It illustrates an approximation of the volume of a paraboloid in using the method of cylindrical shells.

The function is  $f(x) = 4 - x^2$  from  $x = 0$  to  $x = 2$  revolved around the  $y$  - axis. In the corresponding 3D calculator animation, we show visuals of more and more shells as well as a visual of the shells pulled apart so you can see them.

The main thing you are seeing in 6.2 and 6.3 is the options. We need both methods as one allows us to set up the volume in terms of  $x$  and the other allows us to set up the volume in terms of  $y$ . Which variable we want depends on the function and the axis of rotation and many times only one of the two methods will work. So it is important that we have the ability to set up problems with the variable of our choosing. Cylindrical shells give that other option and it is a method you must know.

As you move into Math 126 you will see the value of being able to label a given region in terms of  $x$  or in terms of  $y$ . And there will be a third option of labeling in terms of polar. Being able to describe a region is vital and we are happy to have the flexibility of several options. This is your first glimpse into these ideas.