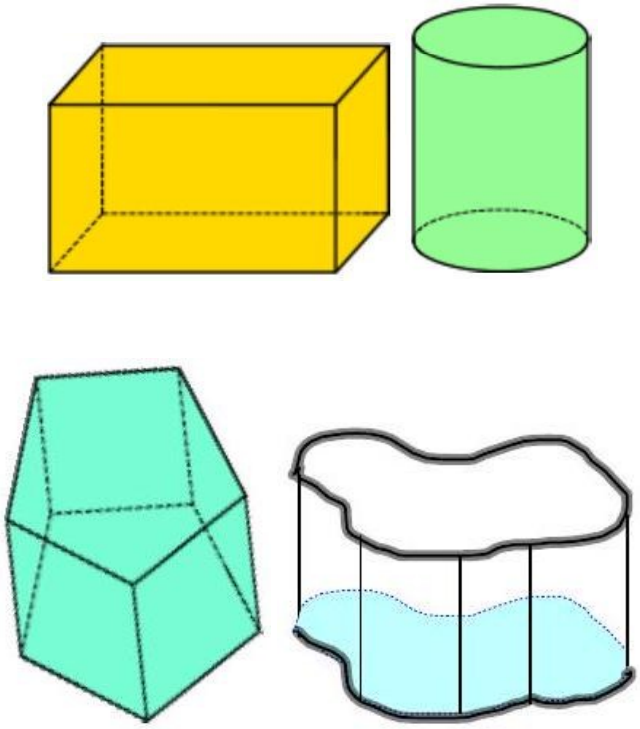
Math 1210 #30
Volume of Solids

The volume of a solid right prism or cylinder is the area of the base times the height.

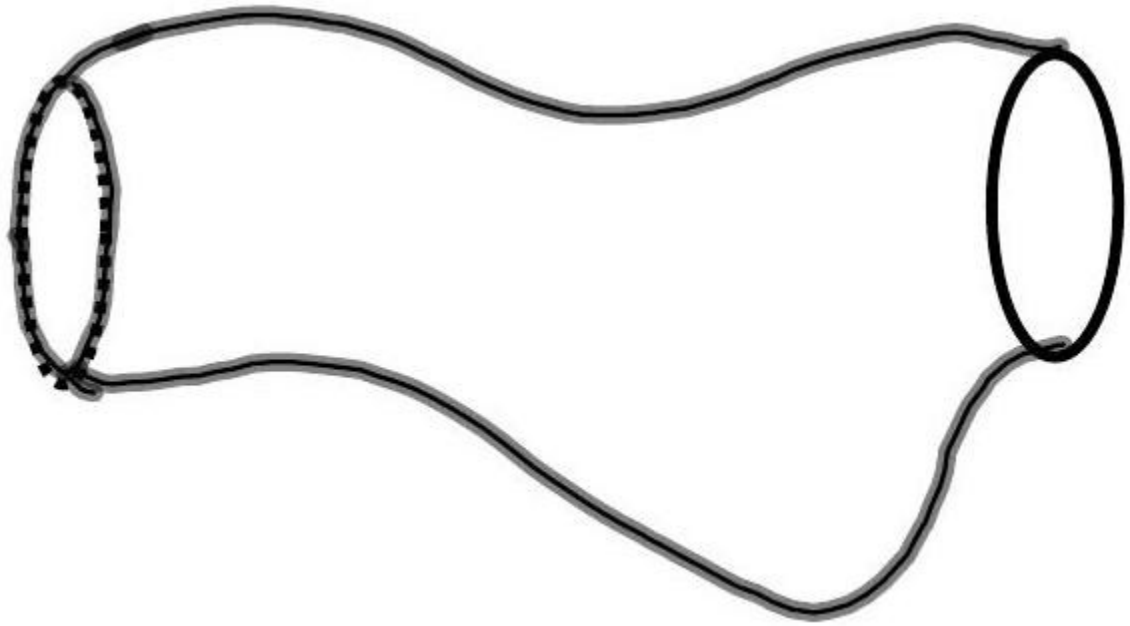


Volume of one penny:

Volume of a stack of pennies:

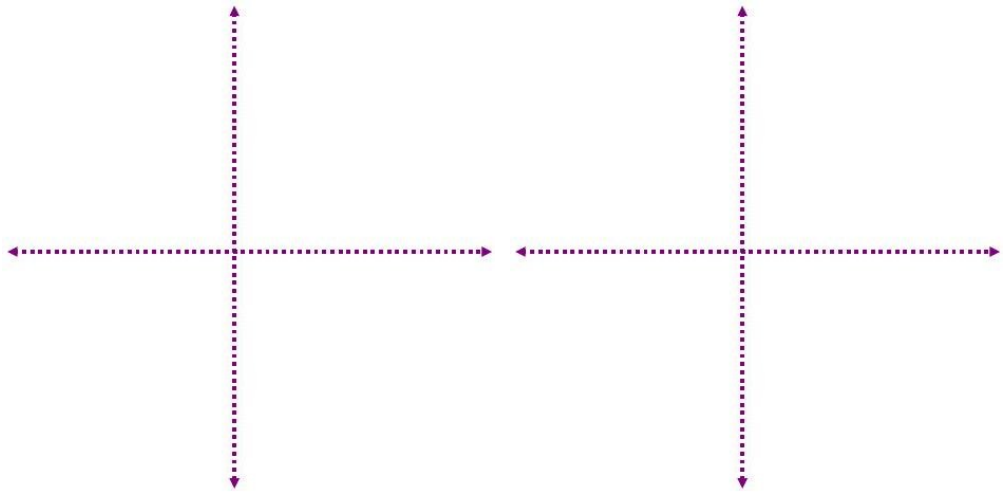
Disk Method

How would we find the volume of a shape like this?



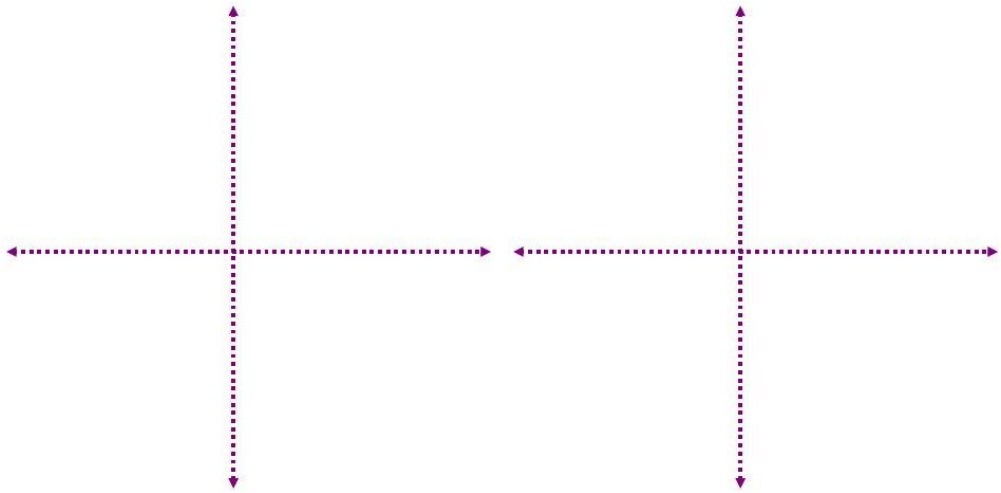
EX 1

Find the volume of the solid of revolution obtained by revolving the region bounded by $y = \sqrt{x}$, the x-axis and the line $x = 9$ about the x-axis.



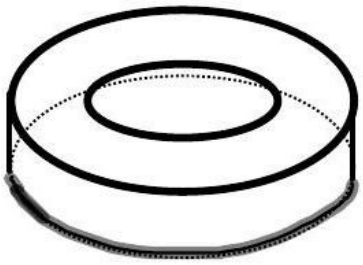
EX 2

Find the volume of the solid generated by revolving the region enclosed by $x = \frac{2}{y}, y = 2, y = 6$, and $x = 0$ about the y-axis.



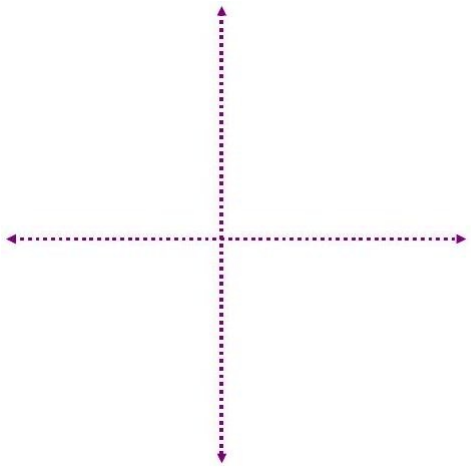
Washer Method

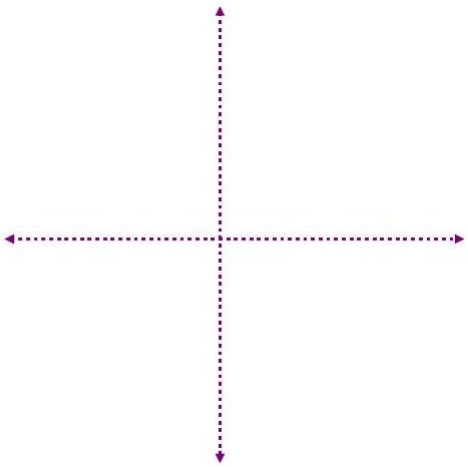
How would we find the volume of a washer?



EX 3

Find the volume of the solid generated by revolving about the x-axis the region bounded by $y = 6x$ and $y = 6x^2$.

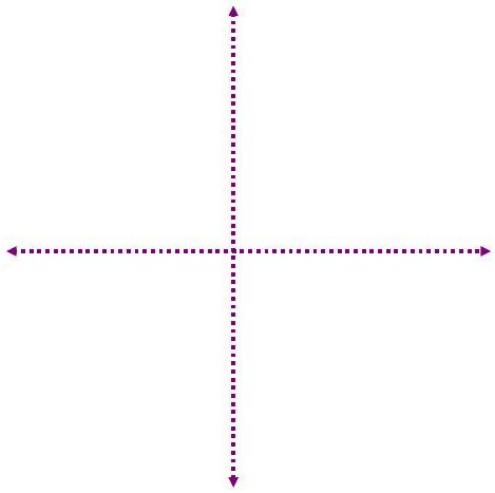




EX 4

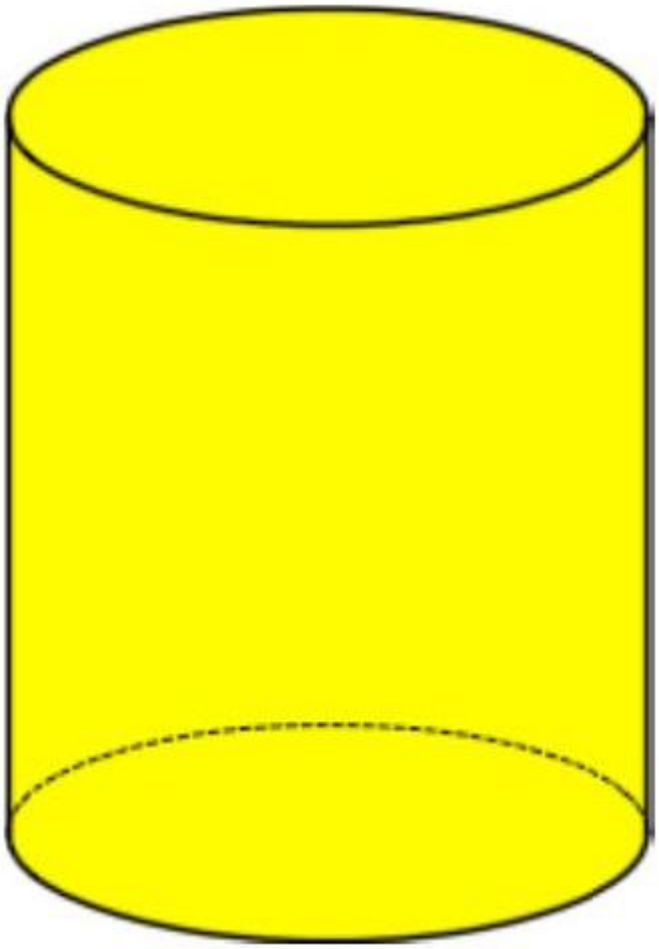
Find the volume of the solid generated by revolving about the line $y = 2$ the region in the first quadrant bounded by these parabolas and the y -axis. (Hint: Always measure radius from the axis of revolution.)

$$3x^2 - 16y + 48 = 0$$
$$x^2 - 16y + 80 = 0$$



Shell Method

How would we find the volume of a label we peel off a can?



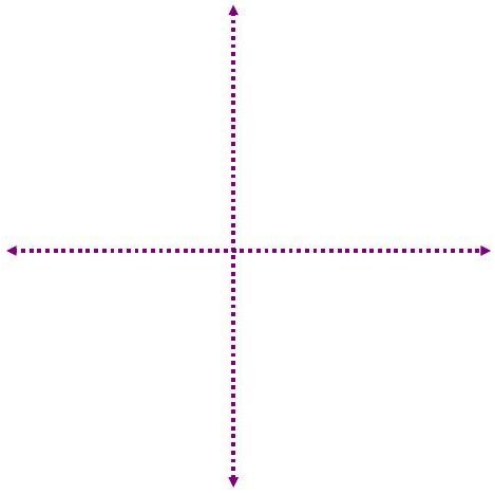
EX 5

Find the volume of the solid generated when the region bounded by these three equations is revolved about the y-axis.

$y = x^2$

$x = 1$

$y = 0$



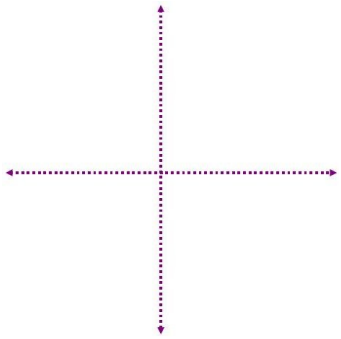
EX 6

Find the volume of the solid generated when the region in the first quadrant bounded by these equations is revolved about the y-axis in two ways.

$$y = 9 - x^2, x \geq 0\ x = 0\ y = 0$$

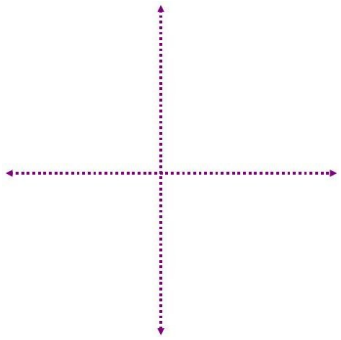
6a)

Shell method



6b)

Disk method



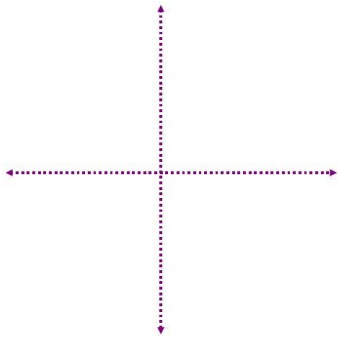
EX 7

Find the volume of the solid generated when the region in the first quadrant bounded by these equations is revolved about the line $x = 3$.

$y = 9 - x^2, x \geq 0$

$\boldsymbol{x = 0}$

$y = 0$



EX 8

A region, R is shown below. Set up an integral for the volume obtained by revolving R about the given line.

8a)

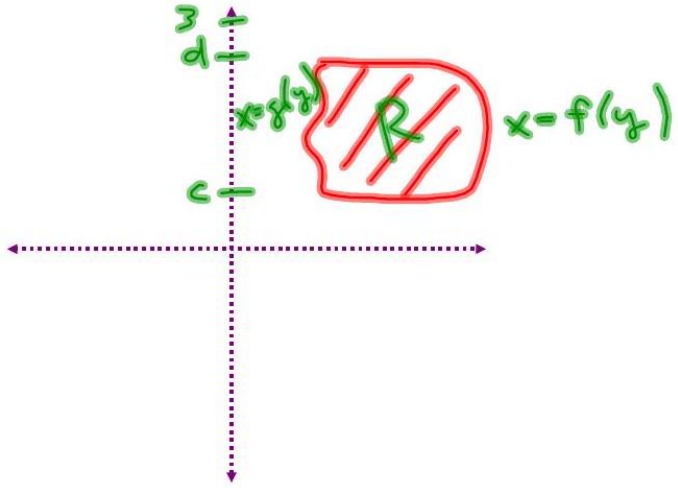
The y-axis

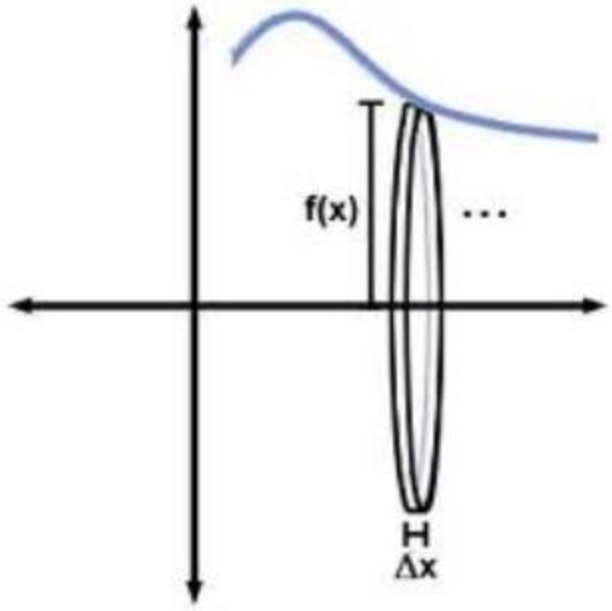
8b)

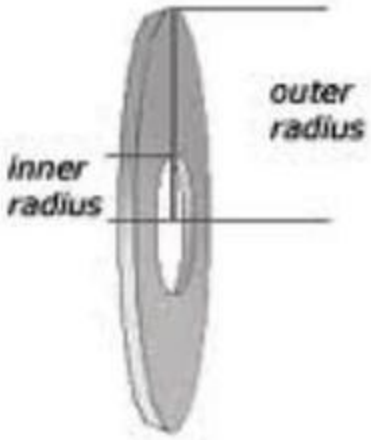
The x-axis

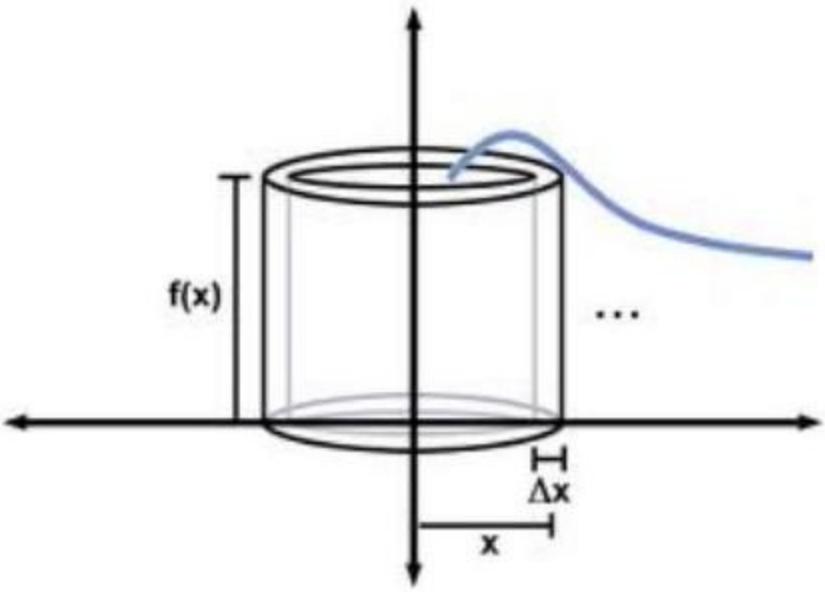
8c)

The line $y = 3$




f(x)
...
H
Δx


outer
radius
inner
radius


f(x)
...
Δx
x