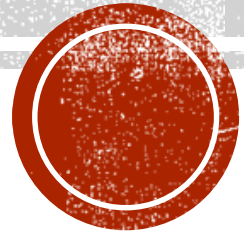
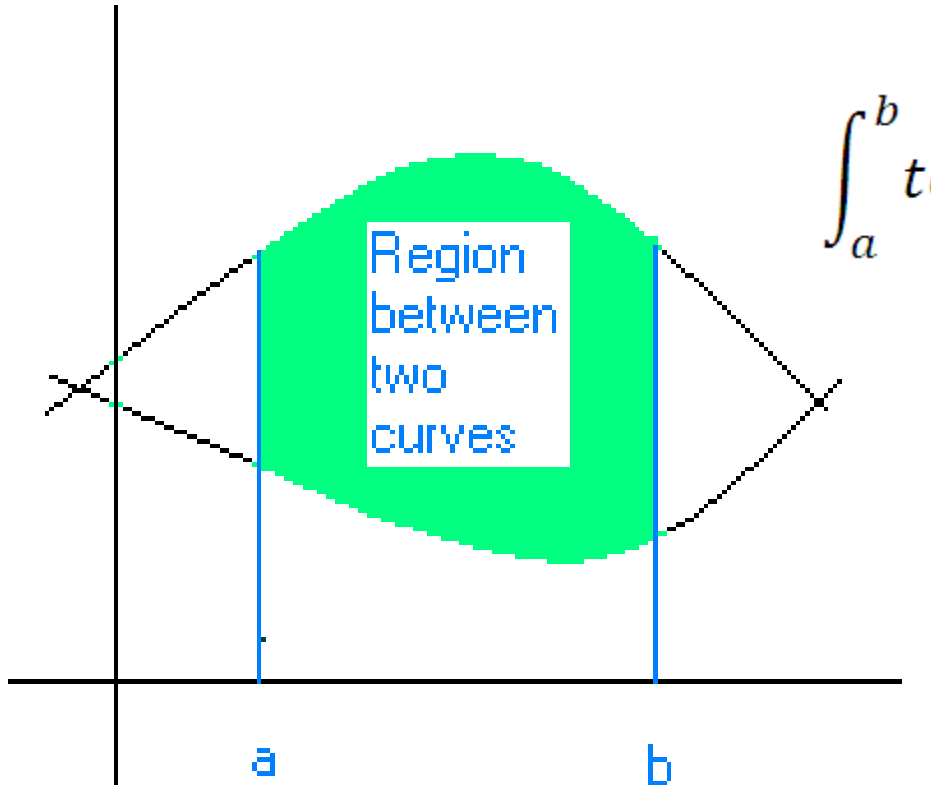
REVIEW OF AREA AND VOLUME

Calculus BC

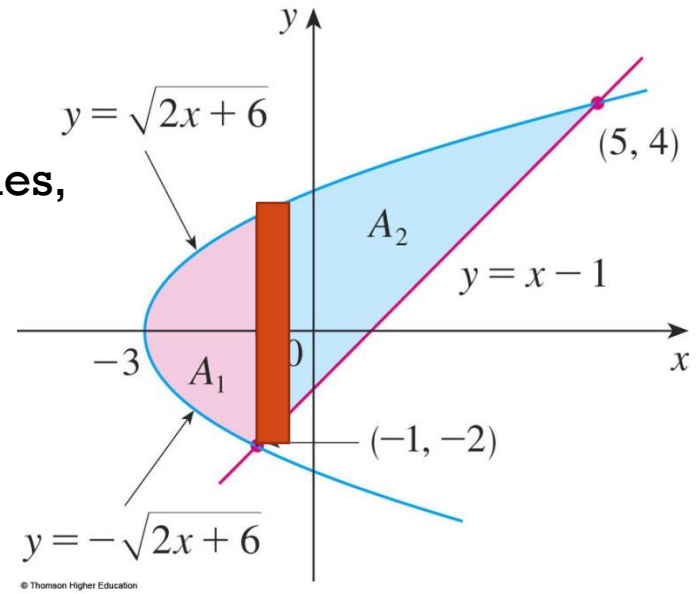




$$\int_a^b top\ curve - bottom\ curve\ dx$$

We calculated the area based on vertical rectangles,

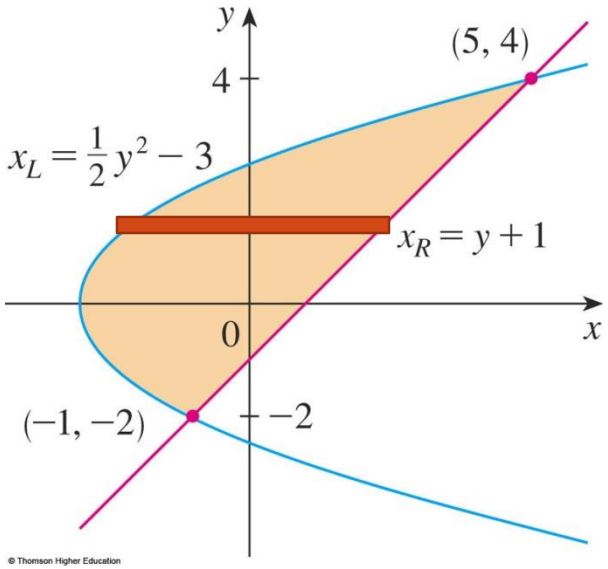
$$\int_{x-value}^{x-value} top\ curve - bottom\ curve\ dx$$



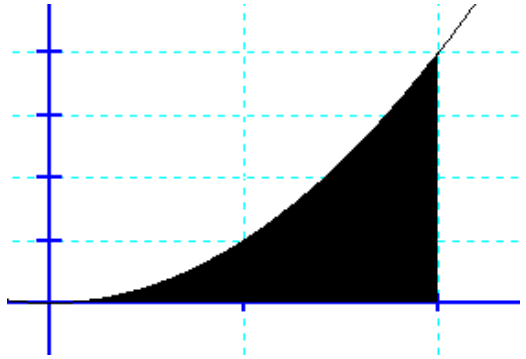
Sometimes it is easier to calculate the area using horizontal rectangles.

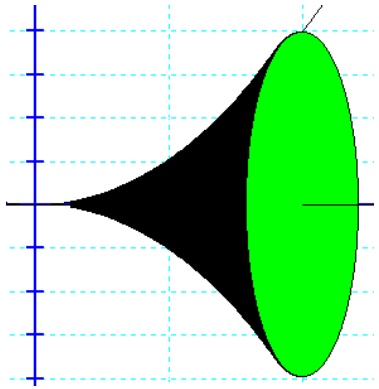
Notice the equations have been written in terms of y.

$$\int_{y-value}^{y-value} right\ curve - left\ curve\ dy$$



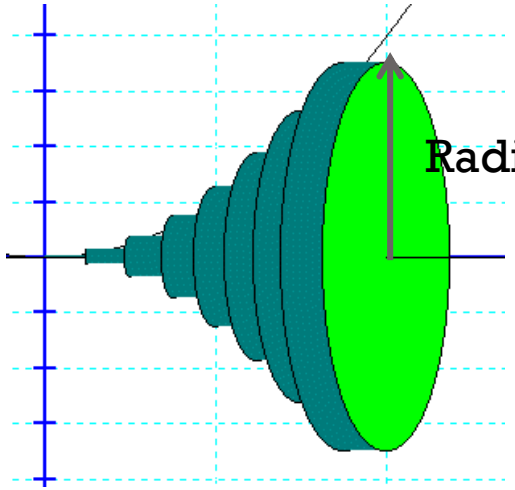
Revolve a region **about the x-axis** to create a solid





To find the volume add the circle from x –value to to x -value

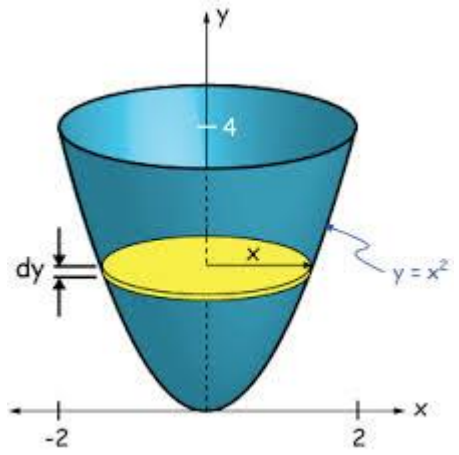
$$V = \int_{x-value}^{x-value} \pi r^2 dx$$



Radius = y = f(x)

$$V = \int_{x-value}^{x-value} \pi [f(x)]^2 dx$$

Revolve a region **about the y-axis** to create a solid



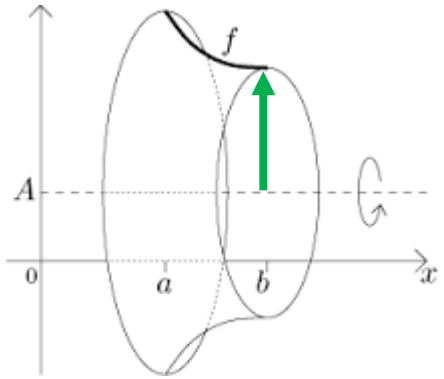
Radius = x = f(y)

To find the volume add the circle from y –value to to y -value

$$V = \int_{y-value}^{y-value} \pi r^2 dy$$

$$V = \int_{y-value}^{y-value} \pi [f(y)]^2 dy$$

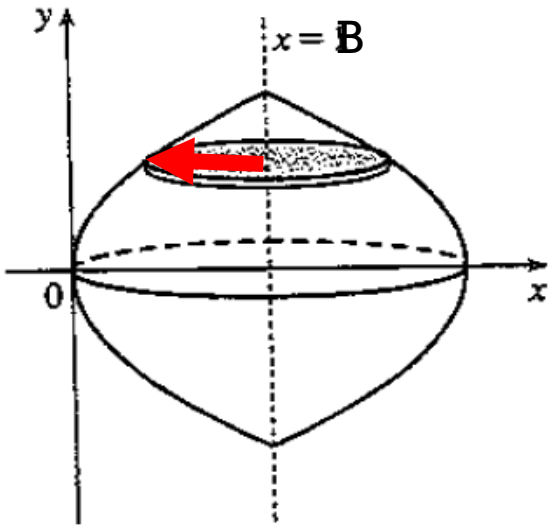
Revolving a solid around a horizontal line y = A



Volume = $\int_{x-value}^{x-value} \pi r^2 dx$

Radius = top- bottom = f(x) – A

$$\text{Volume} = \int_{x-value}^{x-value} \pi[f(x) - A]^2 dx$$



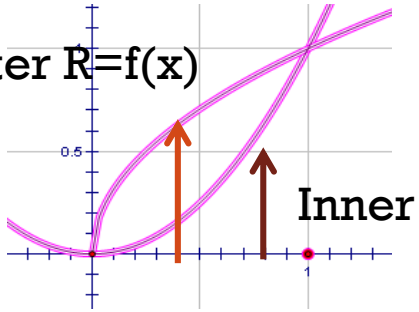
Revolving a solid around a vertical line x = B

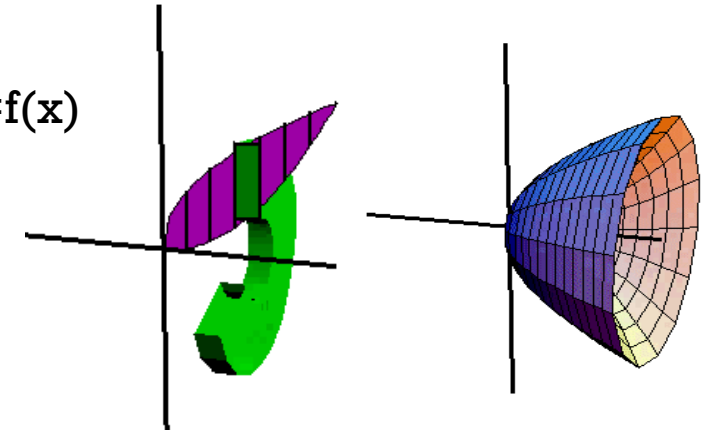
Volume = $\int_{y-value}^{y-value} \pi r^2 dy$

Radius = right - left = B – f(y)

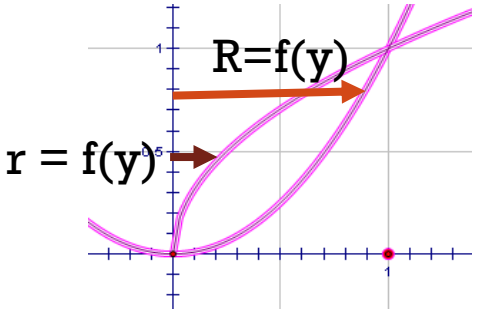
$$\text{Volume} = \int_{y-value}^{y-value} \pi[B - f(y)]^2 dy$$

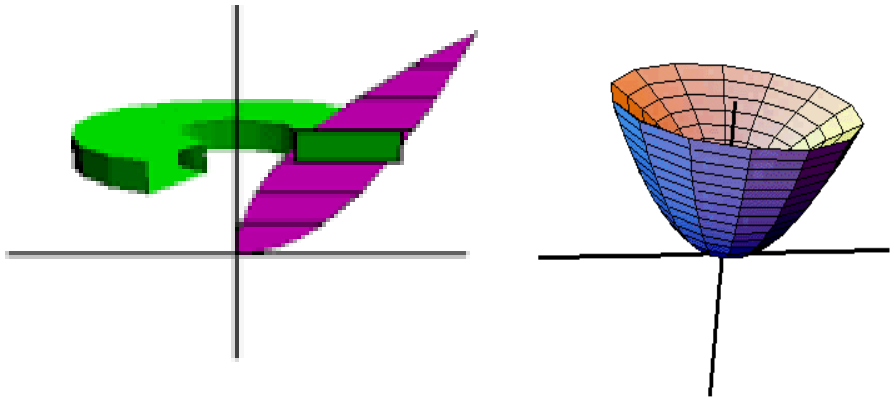
When the region being revolved is not touching the the axis of revolution we get a hole.





$$\text{Volume} = \int_{x-value}^{x-value} \pi R^2 - \pi r^2 \, dx$$





$$\text{Volume} = \int_{y-value}^{y-value} \pi R^2 - \pi r^2 \, dy$$