31: Volume: The **Disk** Method

aka the **Washer** Method
(washer is a disk with a hole)

Key ideas to keep in mind for this section:

DRAW NICELY!!

Volume of a Disk=$\pi R^2 w$

where R=Radius

w=width of the disk

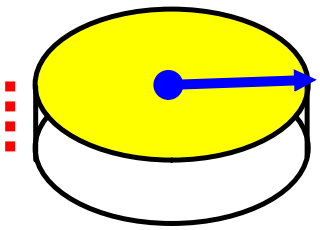
Volume of a Washer: $V=\pi(R^2-r^2)w$

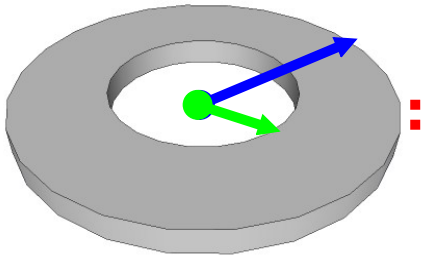
where R=outer radius

r=inner radius

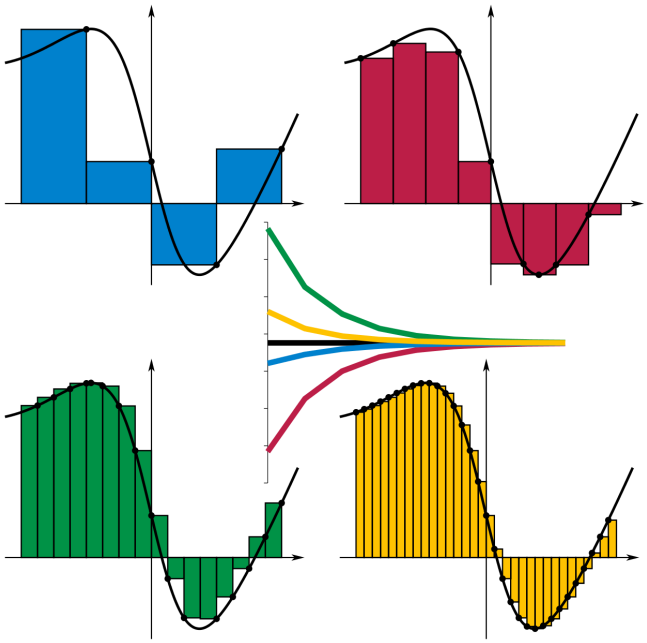
radius=(axis-function)

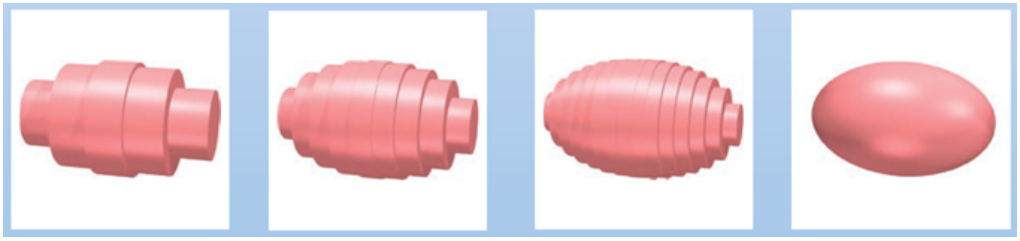
$A=\pi R^2-\pi r^2$

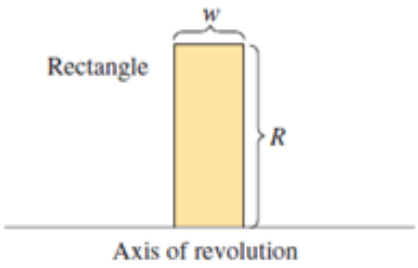


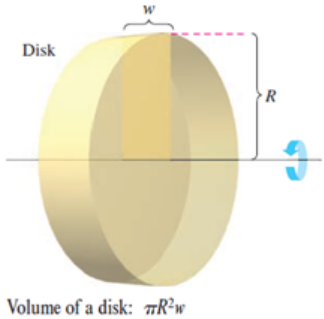


We want to now be able to find VOLUME, we do that by using disks (or washers). In a similar method we found area using Riemann Sums (adding up a bunch of rectangles), we will now be adding up a bunch of disks.









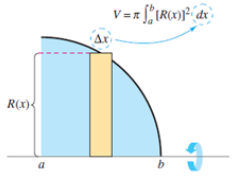
http://demonstrations.wolfram.com/VolumesUsingTheDiscMethod/

Washer/Disk Method

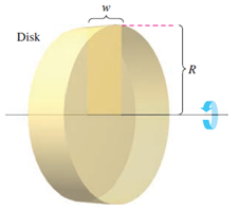
radius=(axis-function)
R(x) =(# - f(x))

Volume of a Disk=$\pi R^2 w$

$$V = \pi \int_a^b [R(x)]^2 \, dx$$

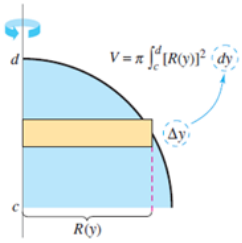


Horizontal axis of revolution

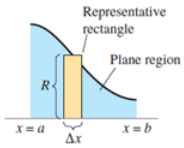


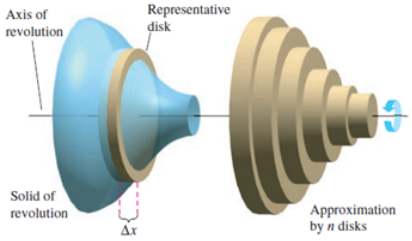
Volume of a disk: $\pi R^2 w$

$$V = \pi \int_c^d [R(y)]^2 \, dy$$



Vertical axis of revolution

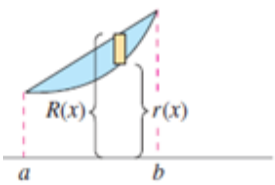


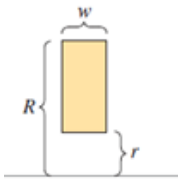


Volume of a Washer: $V=\pi(R^2-r^2)w$

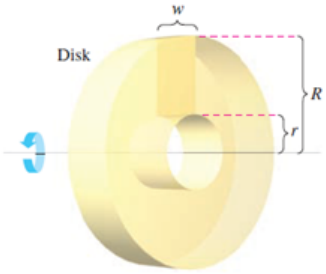
$\pi R^2 - \pi r^2$

$$V = \pi \int_a^b \left([R(x)]^2 - [r(x)]^2 \right) dx$$





Axis of revolution



Solid of revolution

$$V = \pi \int_c^b \left([R(y)]^2 - [r(y)]^2 \right) dy$$