Volume of a Solid

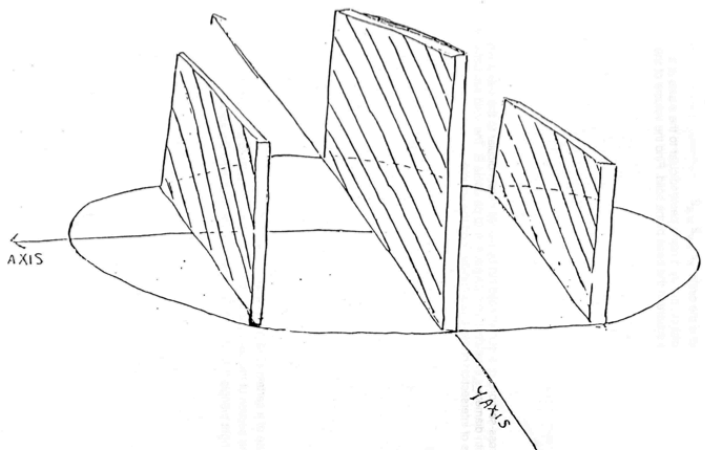
The volume of a solid can be found by finding the sum of the area of the cross sections.

$$V = \int_a^b A(x)\,dx.$$

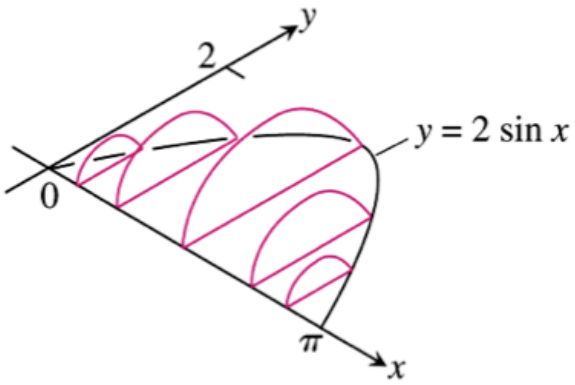
How to Find Volume by Slicing

1. Sketch the solid and a typical cross section.
2. Find a formula for the area of the cross section.
3. Find the bounds of integration.
4. Integrate A(x) to find volume.

The circle formed by $x^2 + y^2 = 1$ represents the base of a solid. Squares are stacked perpendicular to the x-axis to form a 3-D object. Find the volume of that solid.



A solid is made so that its base is the shape of the region between the x-axis and one arch on the curve y = 2sin x. Each cross section cut perpendicular to the x-axis is a semi-circle whose diameter runs from the x-axis to the curve. Find the volume of the solid



Solids of Revolution

-Formed when a curve or region is revolved around a line.

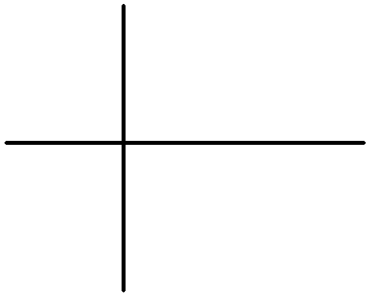
-The cross section of a solid of revolution is circular.

-These cross sections are either in the shape of a disc or a washer (donut!!!).

Discs

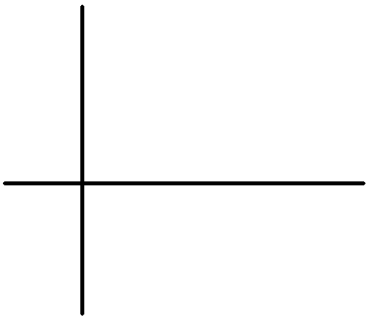
Find the volume of the solid generated by revolving the region bounded by the lines and curves about the x-axis.

$y=2x$ $x=4$



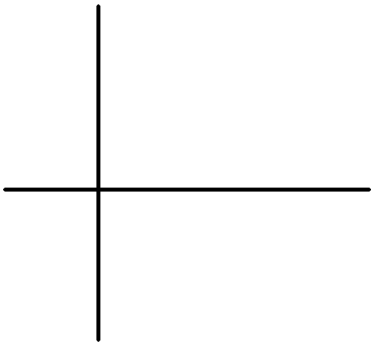
Find the volume of the solid generated by revolving the region bounded by the lines and curves about the x-axis.

$y=x^2$ $y=0$ $x=3$



Find the volume of the solid generated by revolving the region bounded by the lines and curves about the x-axis.

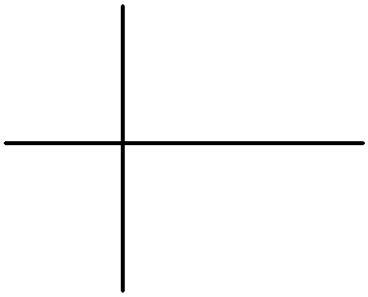
$y=x-x^2$ $y=0$



Washer (Donut Method)

Find the volume of the solid generated by revolving the region bounded by the lines and curves about the x-axis.

$y=2x$ $y=8$ $x=0$



Find the volume of the solid generated by revolving the region bounded by the lines and curves about the x-axis.

$y=4-x^2$ $y=2-x$