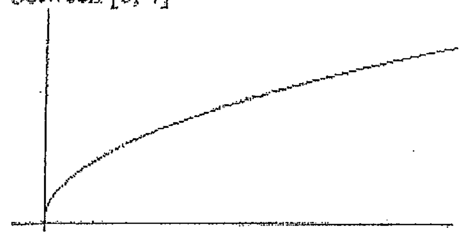
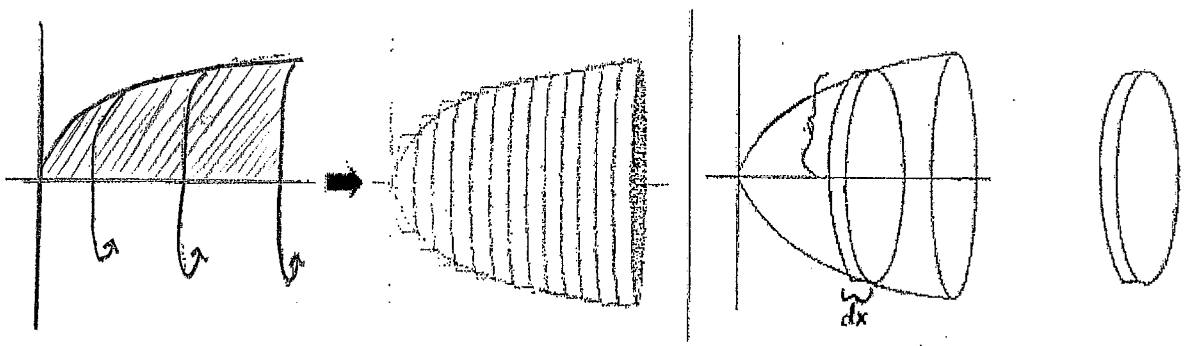
Recall, finding area under the curve $y = \sqrt{x}$ between [0, 4]





Radius $[R(x)]$ = *distance from the AOR (Axis of Revolution) to the graph curve*

$$\textbf{Disc Method}: Volume = \pi \int_{x_1}^{x_2} [R(x)]^2 \, dx$$

Example 1: Find the volume of the solid formed by rotating the graph of $y = \sqrt{x}$ around the x-axis between $x = 0$ and $x = 4$

$Radius\ [R(x)] = distance\ from\ the\ AOR\ (Axis\ of\ Revolution)\ to\ the\ graph\ curve$

$$\textbf{Disc Method}: Volume = \pi \int_{x_1}^{x_2} [R(x)]^2 dx$$

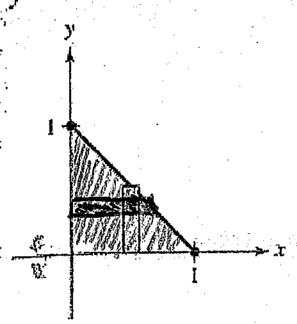
Example 2:

Find the volume of the solid created by $f(x) = 2 - x^2$ revolved around the line $y = 1$

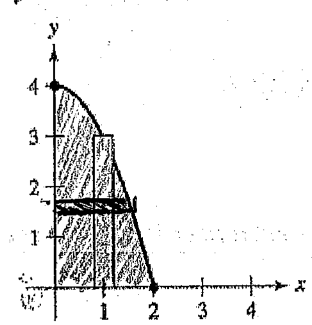
7.2a Disc Method Classwork Problems

Finding the Volume of a Solid In Exercises 1–6, set up and evaluate the integral that gives the volume of the solid formed by revolving the region about the y-axis

1. $y = -x + 1$



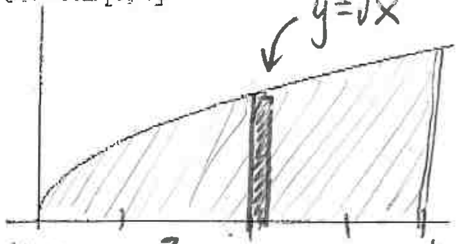
2. $y = 4 - x^2$



3rd

Non-AP Calculus Ch. 7.2a Volume: Disc Method — Notes and Classwork problems

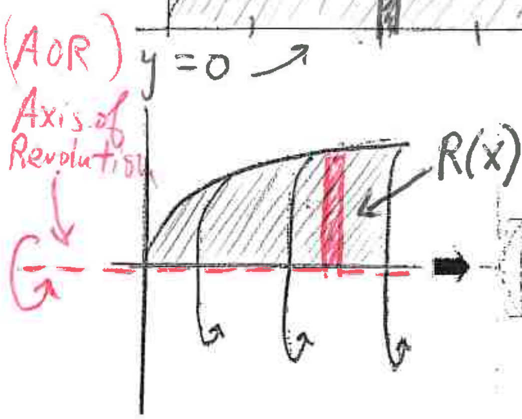
Recall, finding area under the curve $y = \sqrt{x}$ between [0, 4]

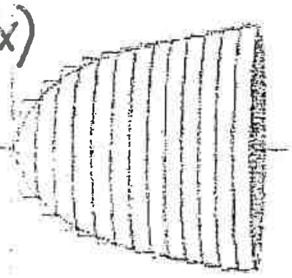


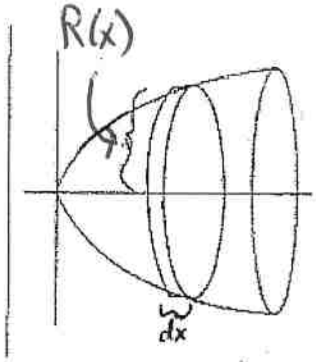
$$\text{Area} = \int_0^4 \underbrace{\sqrt{x} - 0}_{\text{height}}\, \underbrace{dx}_{\text{width}} \rightarrow \int x^{1/2}\,dx \quad \frac{x^{3/2}}{3/2} \quad \frac{2}{3}x^{3/2}\Big]_0^4$$

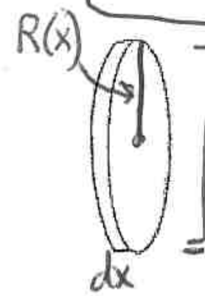
$$\frac{2}{3}(4)^{3/2} - \frac{2}{3}(0)^{3/2}$$

$$\boxed{\text{Area} = \frac{16}{3}\text{ units}^2}$$









$$\text{Area} = \pi r^2$$

$$\pi[R(x)]^2$$

$$\text{Volume} = \int_{x_1}^{x_2} \underbrace{\pi[R(x)]^2}_{\text{Area}}\, \underbrace{dx}_{\text{width}}$$

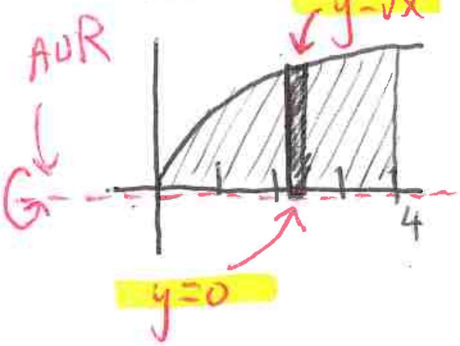
Radius $[R(x)]$ = *distance from the AOR (Axis of Revolution) to the graph curve*

Disc Method: $Volume = \pi \int_{x_1}^{x_2} [R(x)]^2\,dx$

(Top-Bottom) "y = _"

AOR: y=0

Example 1: Find the volume of the solid formed by rotating the graph of $y = \sqrt{x}$ around the x-axis between x = 0 and x = 4



$$R(x) = \sqrt{x} - 0$$

$$R(x) = \sqrt{x}$$

$$V = \pi \int_0^4 [\sqrt{x}]^2\,dx \rightarrow \pi \int_0^4 x\,dx \rightarrow \frac{x^2}{2}\Big]_0^4$$

$$\frac{4^2}{2} - \frac{0^2}{2} = \boxed{8\pi\text{ units}^3}$$

Radius $[R(x)]$ = *distance from the AOR (Axis of Revolution) to the graph curve*

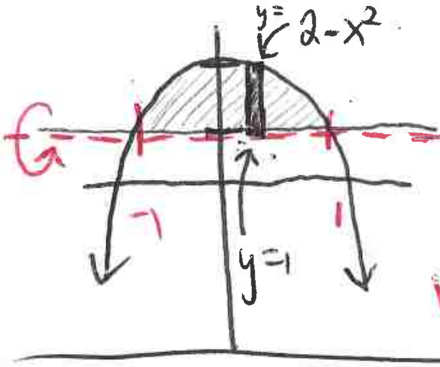
Disc Method: *Volume* $= \pi \int_{x_1}^{x_2} [R(x)]^2\,dx$

Example 2:

Find the volume of the solid created by $f(x) = 2 - x^2$ revolved around the line $y = 1$ and $y=1$ AOR

$y = 2 - x^2$

$y = -x^2 + 2$



$R(x) = 2 - x^2 - (1) = 1 - x^2$

* find bounds (intersections)

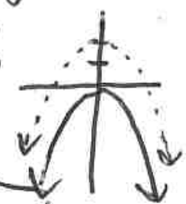
$1 = 2 - x^2$

$\sqrt{x^2} = \pm\sqrt{1}$

$x = -1$

$x = 1$

$V = \pi \int_{-1}^{1} [1 - x^2]^2\,dx$



$\boxed{V = \frac{16}{15}\pi \text{ units}^3}$

7.2a Disc Method Classwork Problems

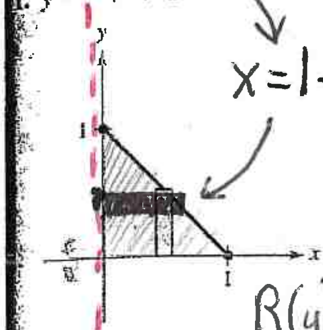
Finding the Volume of a Solid **In Exercises 1–6, set up and evaluate the integral that gives the volume of the solid formed by revolving the region about the ~~x-axis.~~** y-axis AOR

$V = \pi \int_{y_1}^{y_2} [R(y)]^2\,dy$

(Right - Left)

"x = ___"

1. $y = -x + 1$



$x = 1 - y$

Right - Left

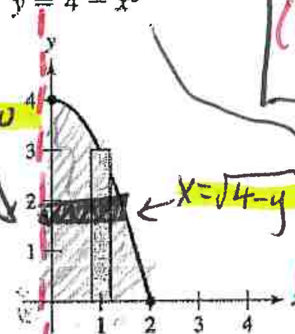
$R(y) = 1 - y - 0$

$R(y) = 1 - y$

$V = \pi \int_0^1 [1 - y]^2\,dy$

$\boxed{V = \frac{1}{3}\pi \text{ units}^3}$

2. $y = 4 - x^2$



$y = 4 - x^2$

$\sqrt{x^2} = \pm\sqrt{4 - y}$

$R(y) = \sqrt{4 - y} - 0$

$R(y) = \sqrt{4 - y}$

$V = \pi \int_0^4 [\sqrt{4 - y}]^2\,dy$

$\boxed{V = 8\pi \text{ units}^3}$