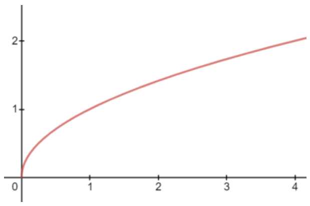
Calculus Ch. 7.2a: Volume by Disc Method

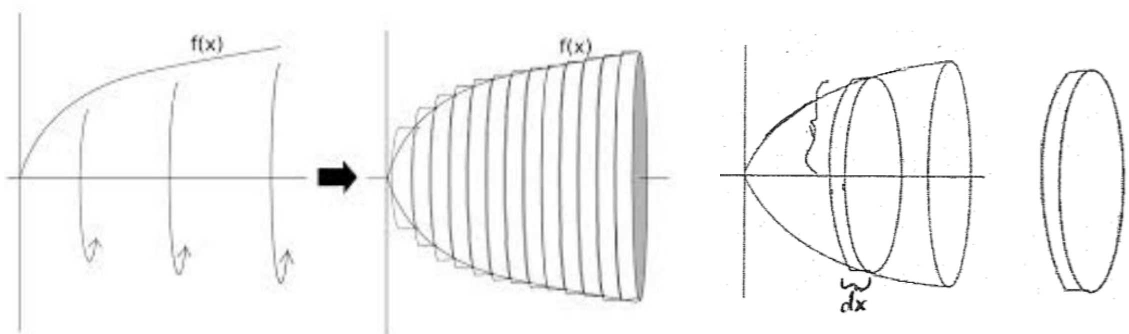
Recall finding area under the curve $y = \sqrt{x}$ between [0, 4]. $Area = \int_a^b (Top\ graph - bottom\ graph)dx$



*Essentially, the Integral Notation allows us to add infinite numbers of differently sized rectangles to form area calculation.

With **Disc Method**, we are going to take this region created by f(x) and the x-axis and rotate this function 360° around the x-axis. What shapes do you see if we were to separate the resulting object into thin slices?

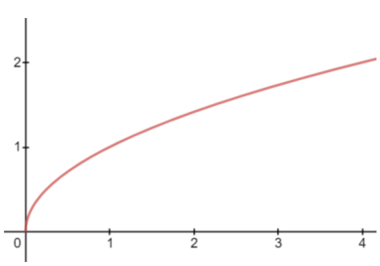
____

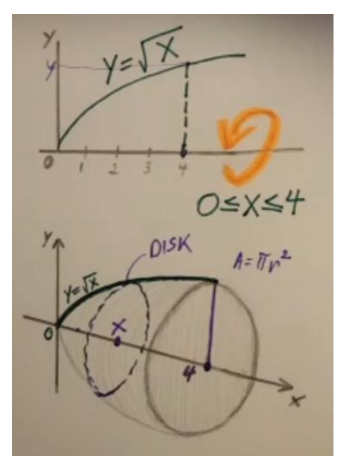


Disc Method: (Top – Bottom) – Vertical Radius	Disc Method: (Right – Left) – Horizontal Radius
$V = \pi \int_{x_1}^{x_2} [R(x)]^2\, dx$	$V = \pi \int_{y_1}^{y_2} [R(y)]^2\, dy$
(expression(s) used above has form: “ y = ___”)	(expression(s) used above has form: “ x = ___”)

Radius [R(x) or R(y)] - distance from the AOR (Axis of Revolution) to the **boundary** of shaded region

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





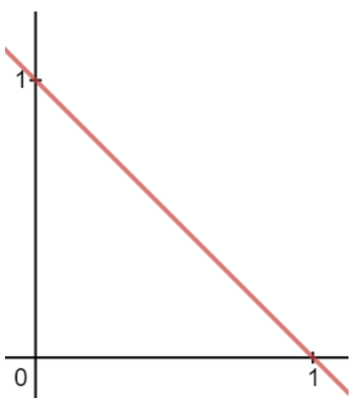
Disc Method: (Top – Bottom) – Vertical Radius – Horizontal AOR	**Disc Method: (Right – Left) – Horizontal Radius Vertical AOR**
$$V = \pi \int_{x_1}^{x_2} [R(x)]^2\, dx$$	$$V = \pi \int_{y_1}^{y_2} [R(y)]^2\, dy$$
(expression(s) used above has form: " y = ___")	(expression(s) used above has form: " x = ___")

Radius [R(x) or R(y)] : distance from the AOR(Axis of Revolution) to the **outer boundary** of shaded region

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

Example 3: Given the region is formed by the function, x-axis, and y-axis. Find the volume of the solid formed by revolving the region about the **y-axis**

a) $y = -x + 1$



b) $y = 4 - x^2$