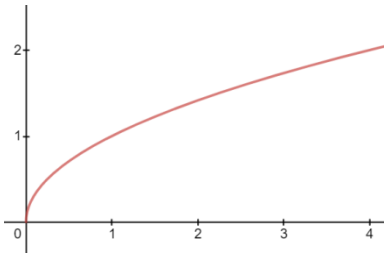
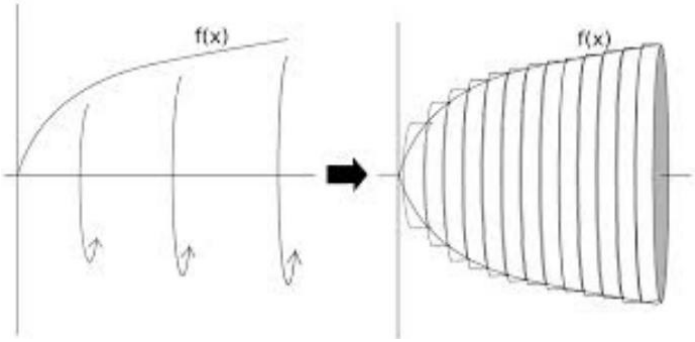
Calculus Ch. 7.2a: Volume by Disc Method

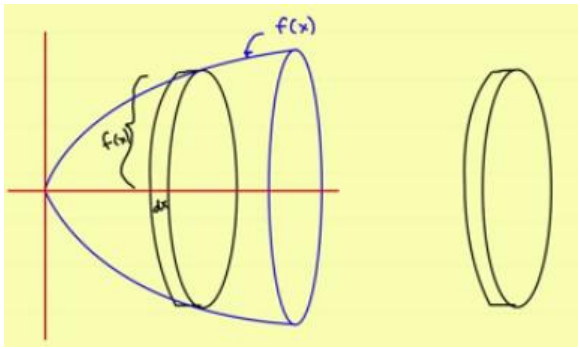
Recall finding area under the curve $y = \sqrt{x}$ between [0, 4]. $Area = \int_a^b (Top\ graph - bottom\ graph)dx$



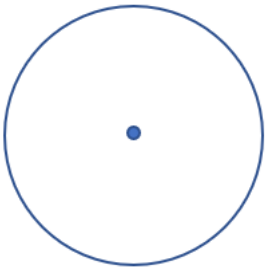
*Essentially, the Integral Notation allows us to add infinite numbers of differently sized rectangles to form area calculation.

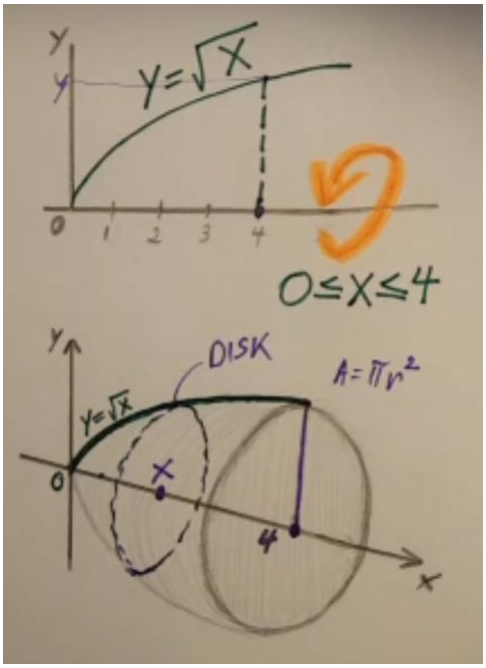
With **Disc Method**, we are going to take this region created by f(x) and the x-axis and rotate this function 360° around the x-axis. What shapes do you see if we were to separate the resulting object into thin slices? _____





Area of Circle is _____





***Volume* (*Disc Method*)**: $V =$

_____

$\boldsymbol{Volume\ (Disc\ Method)}$: $V = \pi \int_a^b [R(x)^2]dx$

Disc Method Steps:

a) Draw dotted line across the x-axis to indicate location of Axis of Revolution **(AOR)**

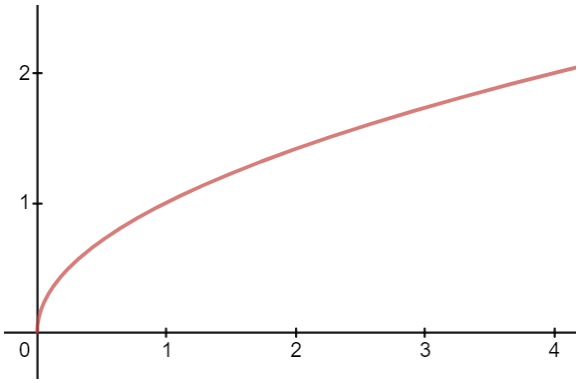
b) Draw the length of **Radius R(x)**: Place pen/pencil **first** on the dotted line (AOR) and extend to outer boundary of shaded region : $[\boldsymbol{R(x) = Top - Bottom}]$

c) Identify the left and right bounds (a and b). If needed, set the equations equal to find bounds.

d) Enter expressions for R(x) and bounds into Disc Method Integral Notation.

e) Enter into calculator to find Volume. (TI-84: Math 9→ FnInt or TI-36X Pro: 2nd → e)

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



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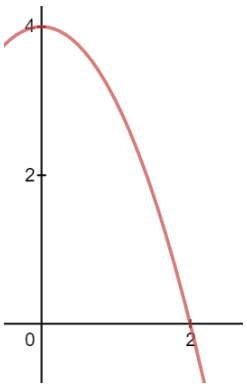
2) **Find the volume of the solid bounded by the x-axis, y-axis, and the curve $y = 4 - x^2$ rotated about the x-axis**



$\boldsymbol{Volume\ (Disc\ Method)}$: $V = \pi \int_a^b [R(x)^2]dx$

Disc Method Steps:

a) Draw dotted line across the x-axis to indicate location of Axis of Revolution **(AOR)**

b) Draw the length of **Radius R(x)**: Place pen/pencil **first** on the dotted line (AOR) and extend to outer boundary of shaded region [$\boldsymbol{R(x) = Top - Bottom}$]

c) Identify the left and right bounds (a and b). If needed, set the equations equal to find bounds.

d) Enter expressions for R(x) and bounds into Disc Method Integral Notation.

e) Enter into calculator to find Volume. (TI-84: Math 9→ FnInt or TI-36X Pro: 2nd → e)

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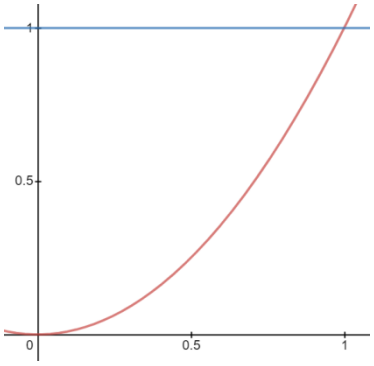
3) **Find the volume of the solid bounded by the y = 1, y-axis, and the graph $y = x^2$ rotated about the line y = 1**



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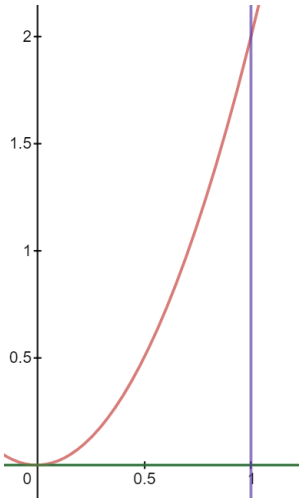
4) **Find the volume of the solid bounded by the y = 0, x = 1, and the graph $y = x^2$ rotated about the x-axis**



Disc Method Steps: $\boldsymbol{Volume\ (Disc\ Method)}$: $V = \pi \int_a^b [R(x)^2]dx$

a) Draw dotted line across the x-axis to indicate location of Axis of Revolution **(AOR)**

b) Draw the length of **Radius R(x)**: Place pen/pencil **first** on the dotted line (AOR) and extend to outer boundary of shaded region $[\boldsymbol{R(x) = Top - Bottom}\ ]$

c) Identify the left and right bounds (a and b). If needed, set the equations equal to find bounds.

d) Enter expressions for R(x) and bounds into Disc Method Integral Notation.

e) Enter into calculator to find Volume. (TI-84: Math 9→ FnInt or TI-36X Pro: 2nd → e)

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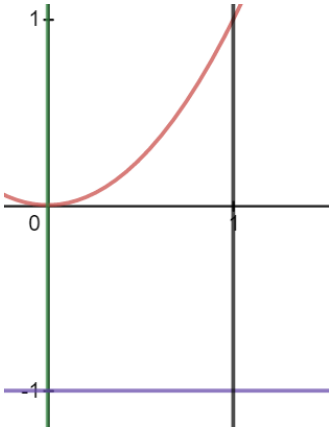
5) **Find the volume of the solid bounded by x = 1, y =- 1, y-axis, and the graph $y = x^2$ rotated about the line y = -1**



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6) **Find the volume of the solid bounded by equations $y = x^2 - x$ and y = 6 rotated about the line y = 6**