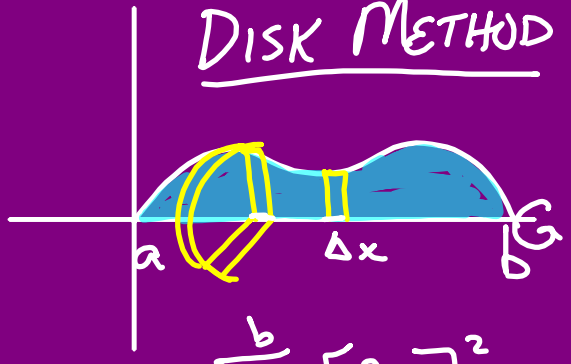
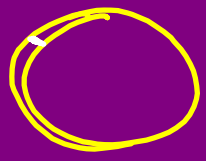
February 18, 2021

VOLUMES OF SOLIDS OF REVOLUTION

DISK METHOD

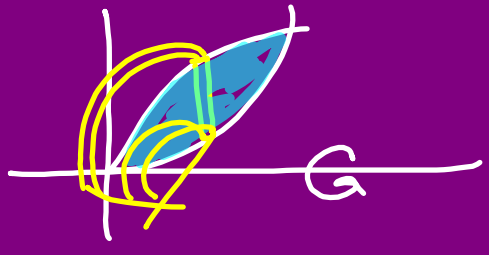


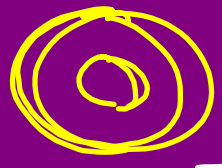


$\pi r^2 h$

$\pi [f(x)]^2 dx$

$$\lim_{\Delta x \to 0} \sum_{x=a}^{b} [f(x)]^2 \Delta x = \pi \int_a^b [f(x)]^2 dx$$





DISK

$\pi r_o^2 dx - \pi (r_i)^2 dx$

$$\pi \int_a^b (r_o^2 - r_i^2) dx$$

around x-axis: y=
around y-axis: x=

[] is ⊥ to axis of revolution

Revolve the region enclosed by

$y = 2x \quad y = x^2$

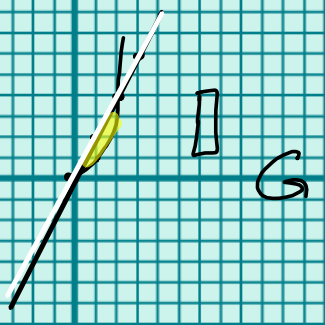
around x-axis.

$$\pi \int \left[(r_o)^2 - (r_i)^2 \right] dx$$

$$\pi \int_0^2 \left[(2x)^2 - (x^2)^2 \right] dx$$

$$\pi \int_0^2 \left(4x^2 - x^4 \right) dx$$

$$= \frac{64\pi}{15} \text{ units}^3$$



$y = x^2 + 4 \qquad y = 2x^2$

$x = 0$ (first quad. only)

Revolve around y-axis

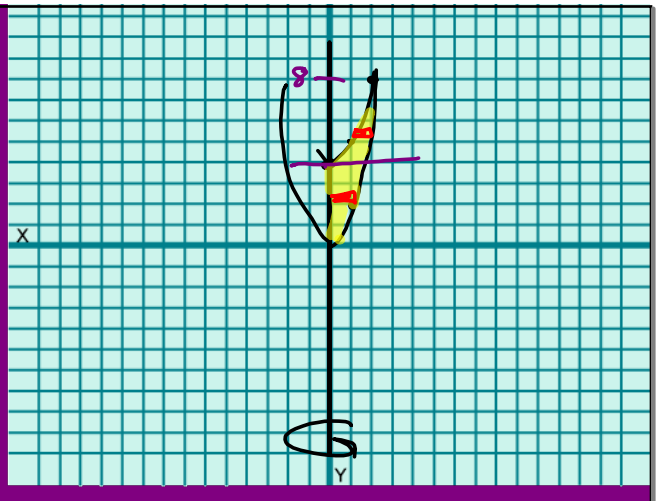
0	0
1	2
2	8
3	9

$y = x^2 + 4$

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

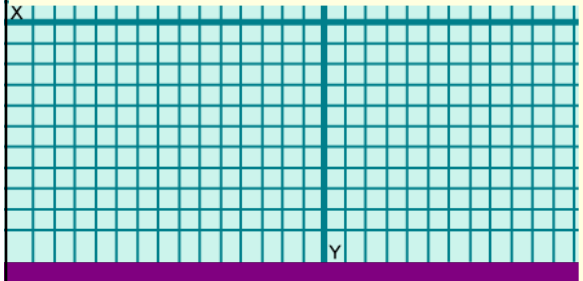
$y = 2x^2$

$\sqrt{\frac{y}{2}} = \sqrt{x^2}$



$$\pi \int_0^4 \left(\left(\sqrt{\frac{y}{2}} \right)^2 - 0^2 \right) dy + \pi \int_4^8 \left[\left(\sqrt{\frac{y}{2}} \right)^2 - \left(\sqrt{y-4} \right)^2 \right] dy$$

$= 8\pi$ units^3



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