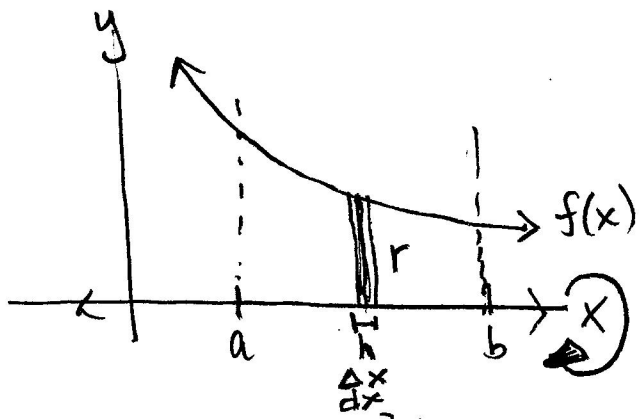
Volume – Disk Method

12/19/18



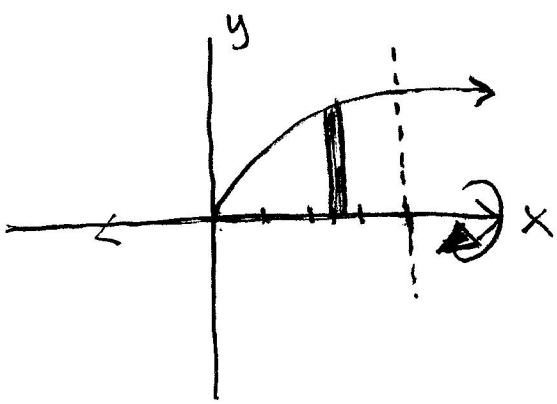
$$V = \pi r^2 h$$

$$V = \pi \int_a^b [f(x)]^2 \, dx$$

- use when region is adjacent to the axis of revolution
- the rect. is ⊥ to the axis of revolution and ⊥ to the axis of integration

Find the volume:

(1) $y = \sqrt{x}$, $y = 0$, $0 \le x \le 4$
revolve around the x-axis

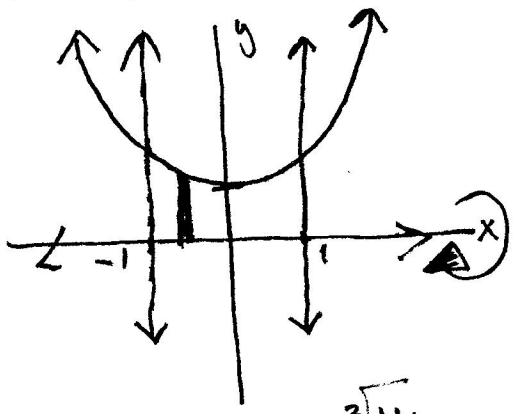


$$V = \pi \int_0^4 (\sqrt{x})^2 \, dx = \pi \int_0^4 x \, dx$$

$$= \pi \cdot \frac{1}{2}x^2 + C \Big|_0^4 = \pi [8 - 0] = 8\pi$$

(2) $y = x^2+1$, $x=-1$, $x=1$, $y=0$

revolve around x-axis



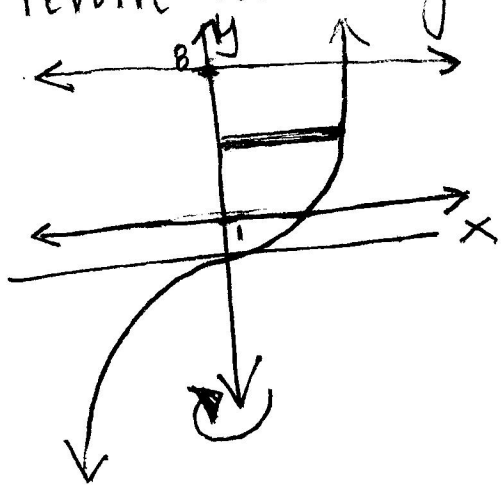
$$V = \pi \int_{-1}^{1} (x^2+1)^2\,dx = \frac{56}{15}\pi$$

3.733π

11.729

(3) $y = x^3 \rightarrow x = \sqrt[3]{y}$, $y=1$, $y=8$, $x=0$

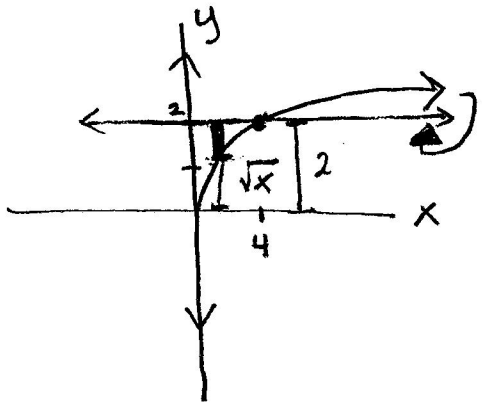
revolve around y-axis



$$V = \pi \int_{1}^{8} \left(\sqrt[3]{y}\right)^2 dy = \frac{93}{5}\pi$$

(4) $y = \sqrt{x}$, $y=2$, $x=0$

revolve around $y=2$



$$V = \pi \int_{0}^{4} \left(2-\sqrt{x}\right)^2 dx = \frac{8}{3}\pi$$

2.667π

8.378