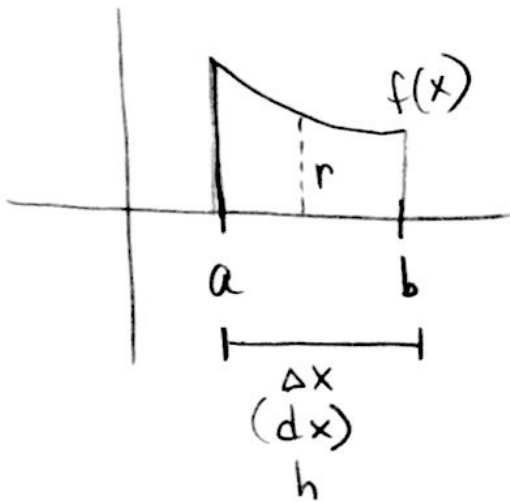


Deriving Disk Formula:

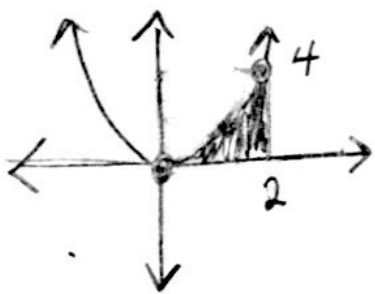


$$V_{\text{cylinder}} = \underbrace{\pi r^2}_{\text{area of circle}} \underbrace{h}_{\text{height of cylinder}}$$

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

Practice: $x = \sqrt{y}$

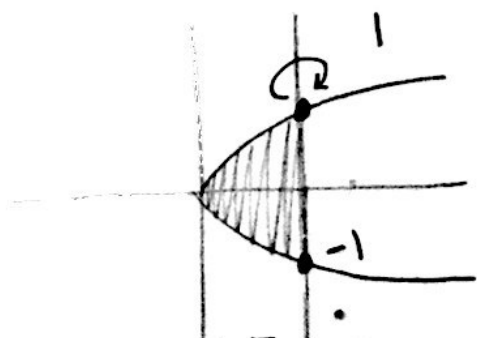
1) $y = x^2$, $x=2$, around x -axis



$$V = \pi \int_0^2 (x^2)^2 dx = \pi \int_0^2 x^4 dx$$

$$= \pi \left(\frac{x^5}{5} \Big|_0^2 \right) = \frac{32\pi}{5} \text{ units}^3$$

2) $y = \pm \sqrt{x}$, $x=1$ around $x=1$



$$V = \pi \int_{-1}^1 (1 - y^2)^2 dy$$

$$= 2\pi \int_0^1 (1 - y^2)^2 dy$$

$$= 2\pi \int_0^1 (1 - 2y^2 + y^4) dy$$

$$2\pi \left[1 - \frac{2}{3} + \frac{1}{5} \right] - 0$$

$$2\pi \left(\frac{15}{15} - \frac{10}{15} + \frac{3}{15} \right)$$

$$2\pi \left(\frac{8}{15} \right) = \frac{16\pi}{15} u^3$$

$$= 2\pi \left(y - \frac{2y^3}{3} + \frac{y^5}{5} \Big|_0^1 \right)$$