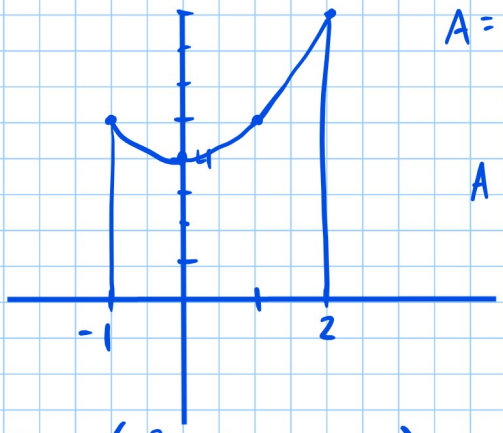
WARMUP

Sketch and find the area of each region:

1) Bounded by $y = x^2 + 4$, $x = -1$, $x = 2$, x-axis

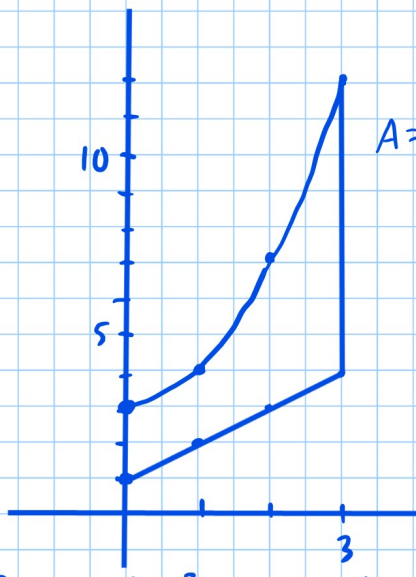


$$A = \int_{-1}^{2} (x^2 + 4)\, dx$$

$$A = 15$$

fnInt$(x^2+4, x, -1, 2)$

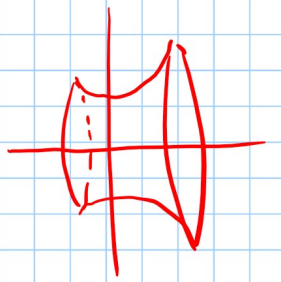
2) Bounded by $y = x^2 + 3$, $y = x + 1$, $x = 0$, $x = 3$



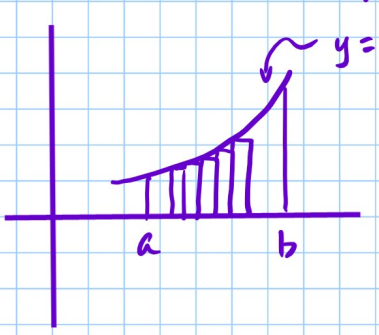
$$A = \int_{0}^{3} (x^2+3) - (x+1)\, dx$$

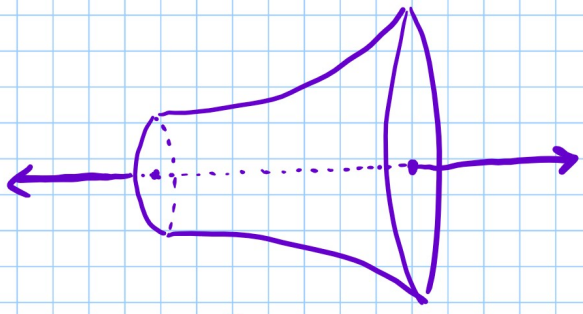
$$A = \frac{21}{2}$$

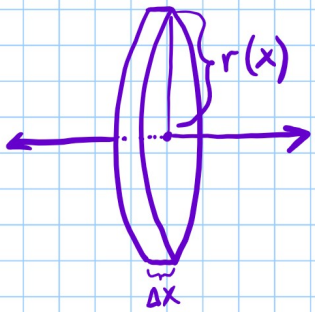
fnInt$((x^2+3)-(x+1), X, 0, 3)$



Volume Using Discs / Washers



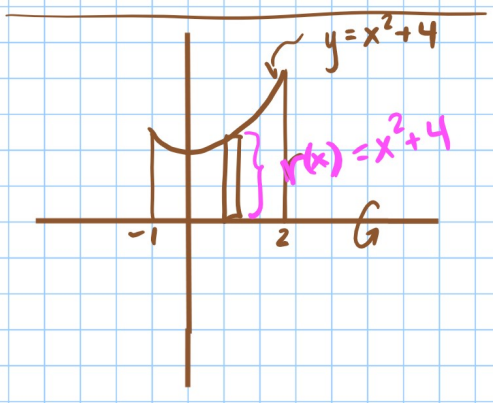




$$V = \pi [r(x)]^2 \Delta x$$

Discs: $V = \pi \int_{a}^{b} [r(x)]^2\, dx$

WARMUP #1 around the x-axis

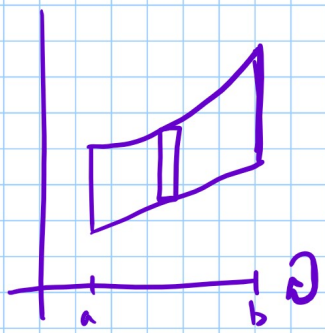


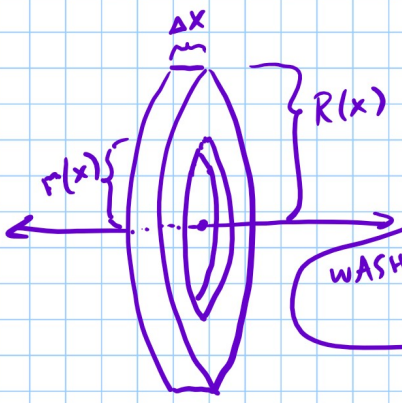
$$V = \pi \int_{-1}^{2} (x^2+4)^2 \, dx$$

$$= \pi \cdot \frac{393}{5} = \frac{393\pi}{5}$$

fnInt((x²+4)², X, -1, 2) ▶ FRAC

WASHER



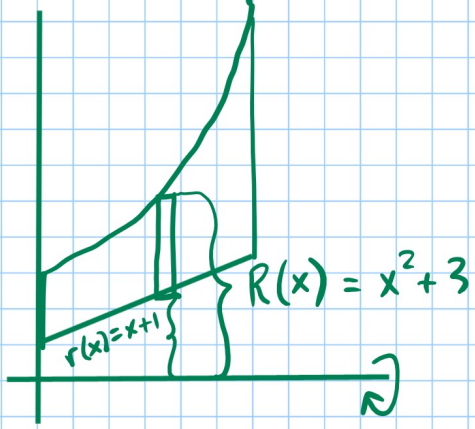


$$\pi \left[R(x)\right]^2 \Delta x - \pi \left[r(x)\right]^2 \Delta x$$

WASHERS: $V = \pi \int_a^b \left[(R(x))^2 - (r(x))^2 \right] dx$

$(\text{outside radius})^2 - (\text{inside radius})^2$

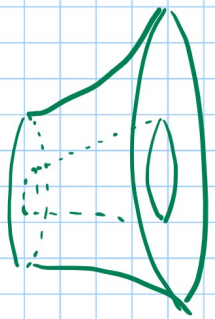
Region from warmup 2 about the x-axis $y = x^2+3$, $y = x+1$



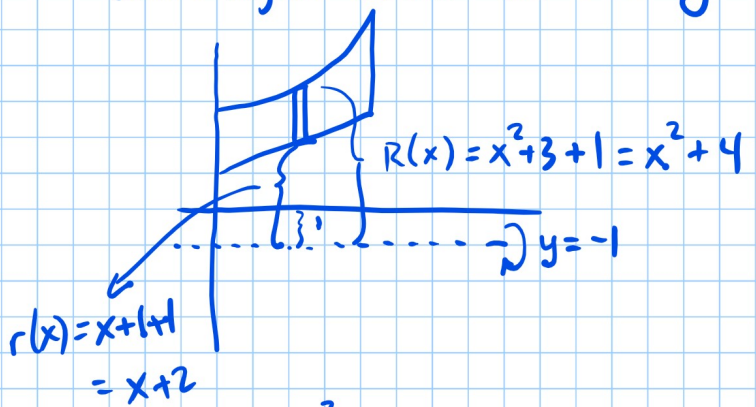
$$V = \pi \int_0^3 \left[(x^2+3)^2 - (x+1)^2 \right] dx$$

$$= \frac{543\pi}{5}$$

fnInt((x²+3)² - (x+1)², X, 0, 3) ▶ FRAC



Same region about the line $y = -1$



$$V = \pi \int_0^3 \left((x^2+4)^2 - (x+2)^2 \right) dx$$

$$= \frac{648\pi}{5}$$

Assignment

sketch region bounded by $y = 6 - x^2$, $x = -2$, $x = 1$ and the x-axis

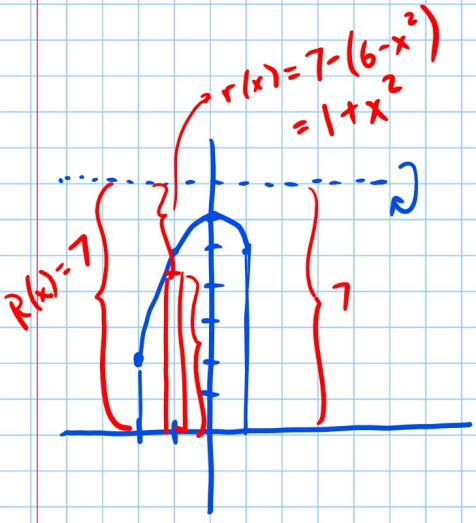
A) Find area

B) Find volume if region is rotated about

i) x-axis

ii) $y = -2$

iii) $y = 7$



$$V = \pi \int_{-2}^{1} \left(7^2 - (1+x^2)^2 \right) dx$$