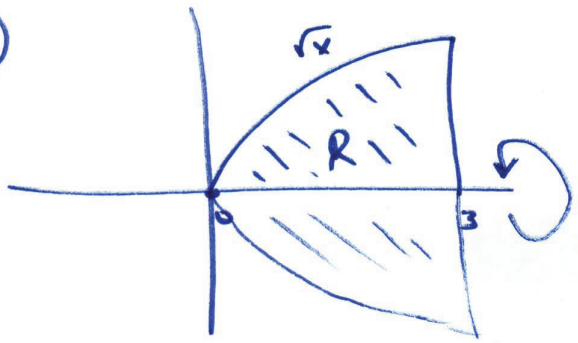
(1)



Disk

$$V = \pi \int_a^b (\text{radius})^2$$

↑ function

$$V = \pi \int_0^3 (\sqrt{x})^2 \, dx$$

$$V = \pi \int_0^3 x \, dx$$

$$V = \pi \left(\frac{x^2}{2} \Big|_0^3 \right)$$

↙

$$\pi \left(\frac{3^2}{2} - \frac{0^2}{2} \right)$$

(@3 − @0)

$$\pi \left(\frac{9}{2} \right)$$

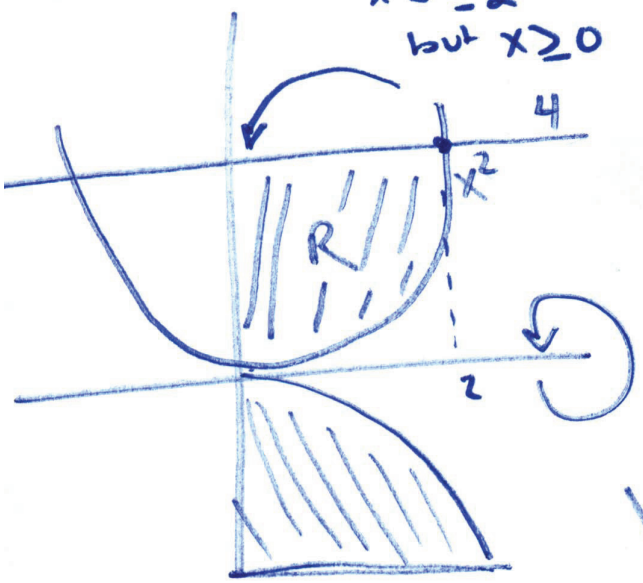
$$\frac{9\pi}{2}$$

(2)

$x^2 = 4$

$x = \pm 2$

but $x \geq 0$



Washers

$$V = \pi \int_a^b \left(\text{BigRadius}\right)^2 - \left(\text{small radius}\right)^2$$

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

$$V = \pi \int_0^2 16 - x^4 \, dx$$

$$V = \pi \left(16x - \frac{x^5}{5} \Big|_0^2 \right)$$

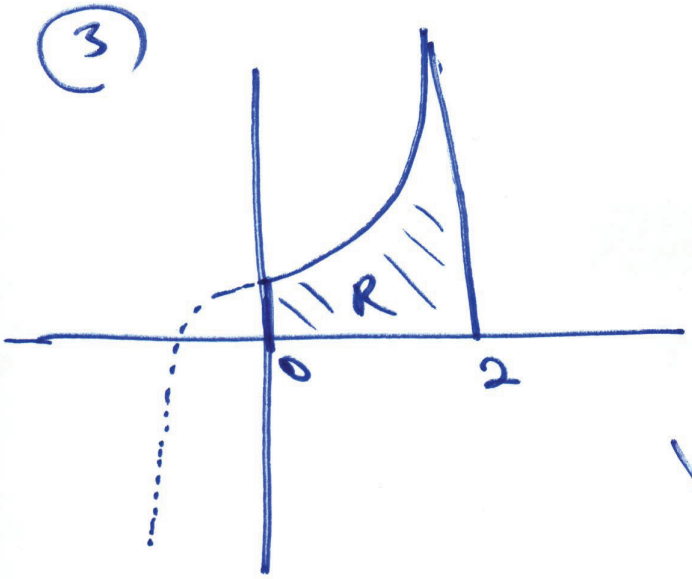
$$\pi \left(\begin{matrix} @\,2 \\ 16(2) - \frac{(2)^5}{5} \end{matrix} - \begin{matrix} @\,0 \\ 0 \end{matrix} \right)$$

$$\pi \left(32 - \frac{32}{5} \right)$$

$$\pi \left(\frac{128}{5} \right)$$

$$\frac{128\pi}{5}$$

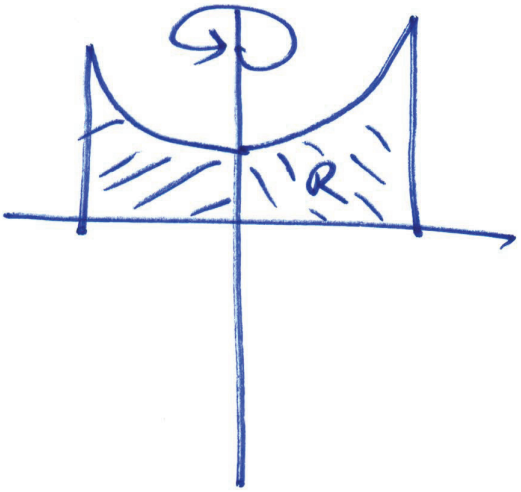
(3)



Shells

$$V = 2\pi \int_a^b (\text{radius})(\text{Height})$$

$$V = 2\pi \int_0^2 (x)(x^3+1)\,dx$$



$$V = 2\pi \int_0^2 x^4 + x\,dx$$

$$V = 2\pi \left(\frac{x^5}{5} + \frac{x^2}{2} \Big|_0^2 \right)$$

$$V = 2\pi \left(\begin{matrix} @\,2 & - & @\,0 \\ \frac{2^5}{5} + \frac{2^2}{2} & - & 0 \end{matrix} \right)$$

$$V = 2\pi \left(\frac{32}{5} + 2 \right)$$

$$V = 2\pi \left(\frac{32}{5} + \frac{10}{5} \right)$$

$$V = 2\pi \left(42/5 \right)$$

$$V = 84\pi/5$$

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

$\sqrt{x} = x^2$

$x = x^4$

$x^4 - x = 0$

$x(x^3 - 1) = 0$

$x = 0$ | $x^3 - 1 = 0$

$+1 \quad +1$

$x^3 = 1$

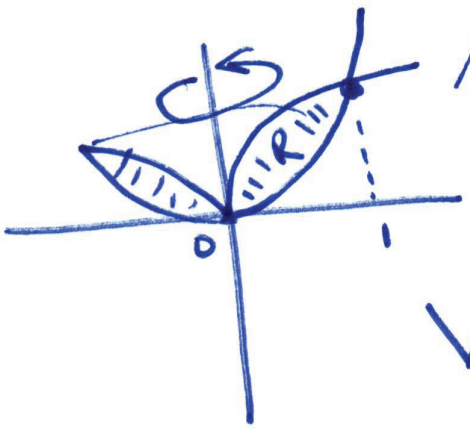
$x = \sqrt[3]{1}$

$x = 1$

Shells with Gap

$$V = 2\pi \int_a^b (\text{radius}) \left[(\text{Big Height}) - (\text{Small Height}) \right]$$

$$V = 2\pi \int_0^1 (x) \left[(\sqrt{x}) - (x^2) \right]$$



$$V = 2\pi \int_0^1 x^{3/2} - x^3 \, dx$$

$$V = 2\pi \left(\frac{x^{5/2}}{5/2} - \frac{x^4}{4} \Big|_0^1 \right)$$

$$V = 2\pi \left(\frac{2}{5} x^{5/2} - \frac{x^4}{4} \Big|_0^1 \right)$$

@1 − @0

$$V = 2\pi \left(\left(\frac{2}{5}(1)^{5/2} - \frac{1^4}{4} \right) - (0) \right)$$

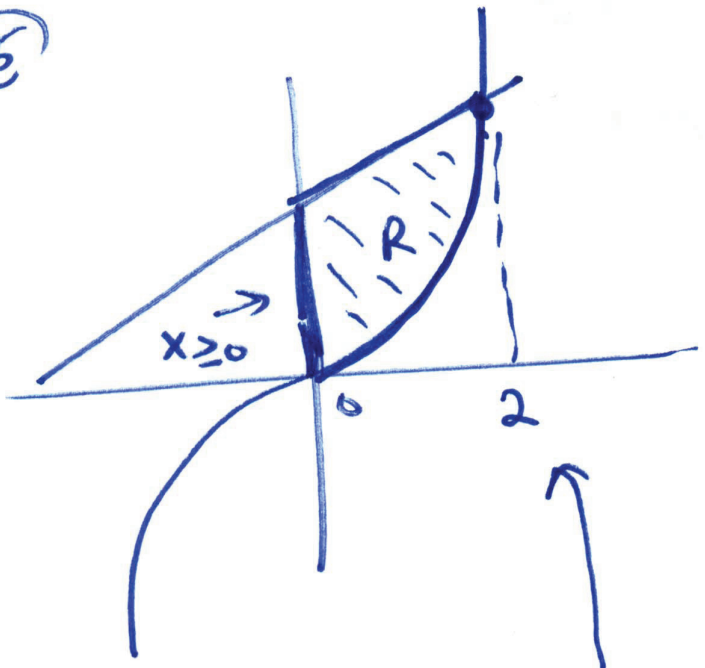
$$V = 2\pi \left(\frac{2}{5} - \frac{1}{4} \right)$$

$$V = 2\pi \left(8/20 - 5/20 \right)$$

$$V = \frac{6\pi}{20}$$

$$V = 3\pi/10$$

(5)



$$\int_a^b (\text{Top Function}) - (\text{Bottom Function})$$

$$\int_0^2 (x+6) - (x^3)\,dx$$

$$\int_0^2 x+6-x^3\,dx$$

$$\frac{x^2}{2} + 6x - \frac{x^4}{4}\Big|_0^2$$

$$@2 \quad - \quad @0$$

$$\frac{2^2}{2} + 6(2) - \frac{2^4}{4} - 0$$

$$2 + 12 - 4$$

10

$x+6 = x^3$

No way to solve
So test #'s

$1+6 = 1^3$

No

$2+6 = 2^3$

yes!

hit @ $x=2$