

$$\textcircled{1a} \pi \int_0^{\pi} \sin^2 x \, dx = \pi \left[\frac{1}{2} x - \frac{1}{4} \sin 2x \right]_0^{\pi}$$

$$= \frac{1}{2} \pi^2$$

$$\textcircled{3a} \pi \int_0^4 \left[(\sqrt{x})^2 - \left(\frac{x}{2}\right)^2 \right] dx = \pi \int_0^4 \left(x - \frac{1}{4} x^2 \right) dx$$

$$= \pi \left[\frac{1}{2} x^2 - \frac{1}{12} x^3 \right]_0^4 = \pi \left[\frac{1}{2} (4)^2 - \frac{1}{12} (4)^3 \right]$$

$$= \pi \left[8 - \frac{16}{3} \right] = \frac{8}{3} \pi$$

$$\textcircled{4a} \frac{dy}{dx} = \underline{-2x} \qquad \frac{dy}{dx} = 2(x-2)$$

$$\int_0^2 \sqrt{1+4x^2} \, dx + \int_0^2 \sqrt{1+4(x-2)^2} \, dx$$

$$\textcircled{b} \int_0^2 (4-x^2 - (x-2)^2) \, dx$$

$$\textcircled{c} \pi \int_0^2 \left[(4-x^2)^2 - (x-2)^4 \right] dx$$

$$x = 4 - y^2 \Rightarrow \frac{dx}{dy} = -2y$$

#5a

$$\underbrace{\sqrt{5^2 + 5^2}}_{\text{OR}} + \int_{-2}^3 \sqrt{1 + 4y^2} \, dy$$

$$\int_{-2}^3 \sqrt{1 + 1} \, dy$$
$$= \left[\sqrt{2} y \right]_{-2}^3$$

$$3\sqrt{2} - (-2)\sqrt{2}$$

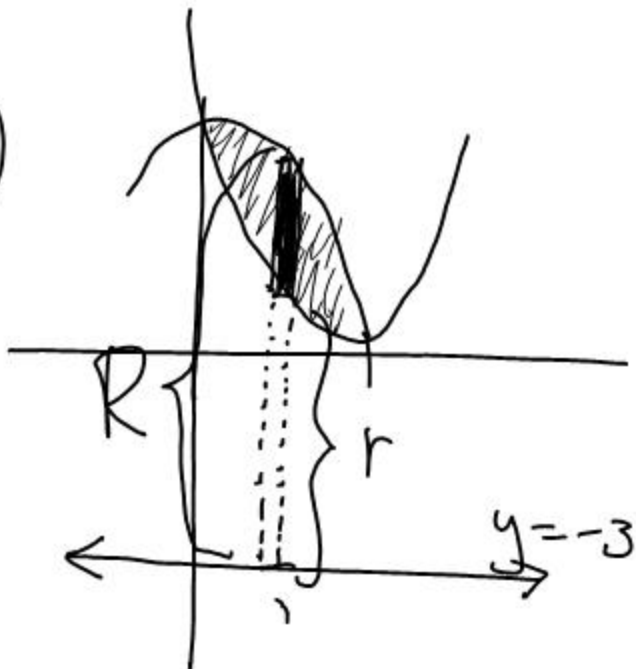
$$5\sqrt{2}$$

5b

$$\int_{-2}^3 \overset{\text{right}}{(4 - y^2)} - \overset{\text{left}}{(-y - 2)} \, dy$$

$$= \int_{-2}^3 (-y^2 + y + 6) \, dy$$

(4d)



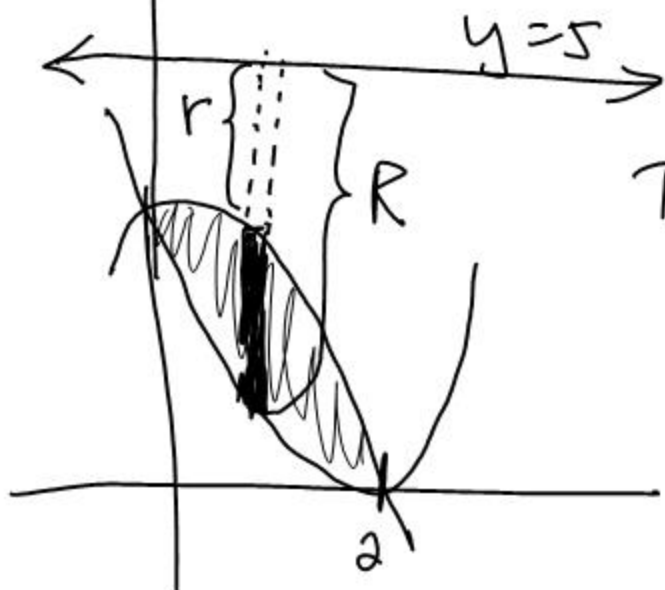
$$R = (4 - x^2) - (-3)$$
$$= 7 - x^2$$

$$r = (x - 2)^2 - (-3)$$
$$= x^2 - 4x + 7$$

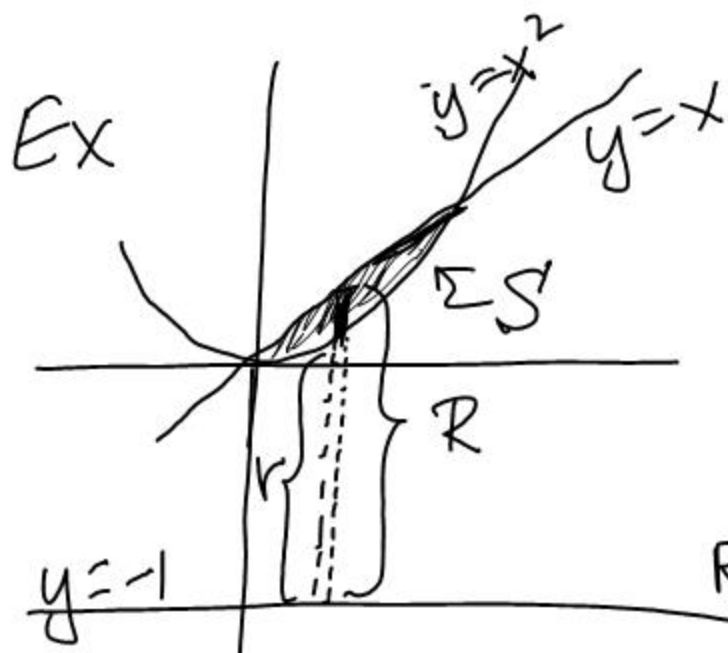
$$\pi \int_0^2 \left[(7 - x^2)^2 - (x^2 - 4x + 7)^2 \right] dx$$

(4e) $R = 5 - (x - 2)^2 = -x^2 + 4x + 1$

$$r = 5 - (4 - x^2) = x^2 + 1$$



$$\pi \int_0^2 \left[(-x^2 + 4x + 1)^2 - (x^2 + 1)^2 \right] dx$$



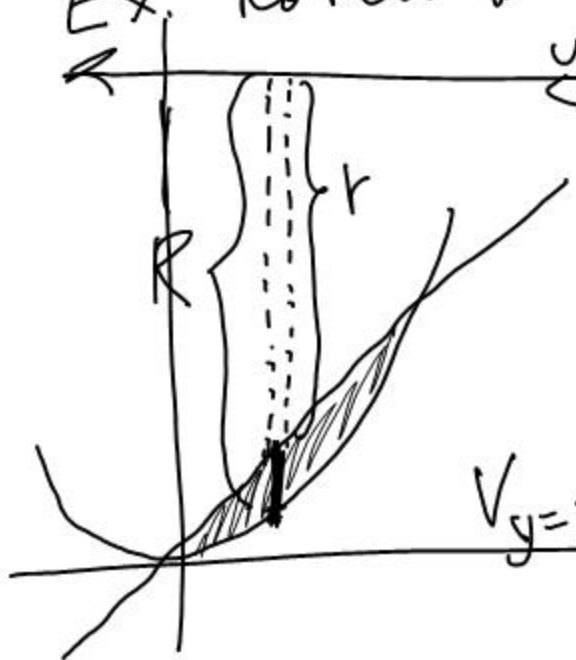
Find the volume if region S is rotated about the line $y=-1$.

$$R = x - (-1) = x + 1$$

$$r = x^2 - (-1) = x^2 + 1$$

$$V_{y=-1} = \pi \int_0^1 [(x+1)^2 - (x^2+1)^2] dx \approx \underline{\underline{1.466}}$$

Ex. Rotate S^* about the line $y=3$

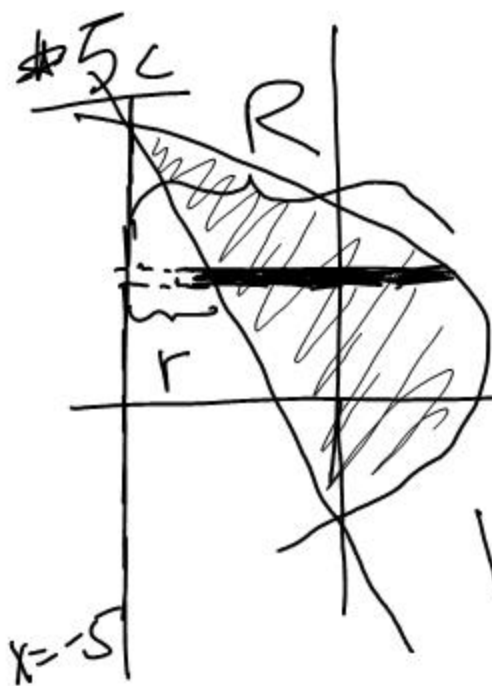


$$R = 3 - x^2$$

$$r = 3 - x$$

$$V_{y=3} = \pi \int_0^1 [(3-x^2)^2 - (3-x)^2] dx$$

$$\pi \int (R^2 - r^2) dx$$



$$R = 4 - y^2 - (-5) = 9 - y^2$$

$$r = -y - 2 - (-5) = 3 - y$$

$$V_{x=-5} = \pi \int_{-2}^3 \left[(9 - y^2)^2 - (3 - y)^2 \right] dy$$

HW #1bc, #3bc,

evaluate
w/ calculator

#5de,

setup
only

#7b
work out
no calculator