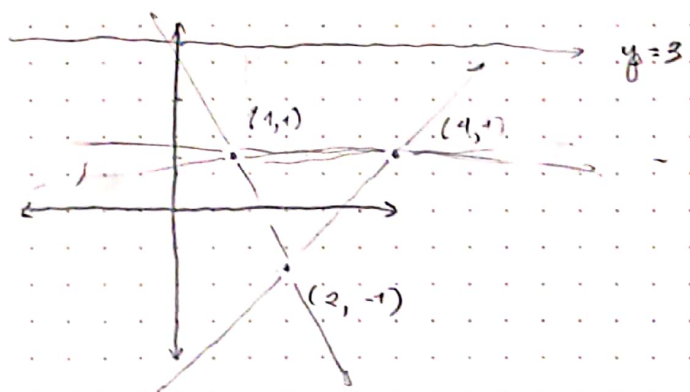


Allyr. About Mattan C.

Question 11.



line passing $(1,1)$ and $(2,-1)$: $y-1 = \frac{1-(-1)}{1-2} (x-1)$

$$y-1 = -2(x-1)$$

$$y-1 = -2x+2$$

$$y = -2x+3 \implies x = -\frac{1}{2}y + \frac{3}{2}$$

line passing $(2,-1)$ and $(4,1)$: $y-1 = \frac{1-(-1)}{4-2} (x-4)$

$$y-1 = x-4$$

$$y = x-3 \implies x = y+3$$

line passing $(1,1)$ and $(4,1)$: $y-1 = 0(x-1)$

$$y = 1$$

Volume using disks and washers: $V = \int_1^2 [\pi(3 - (-2x+3))^2 - \pi(3-1)^2] dx$

$$+ \int_2^4 [\pi(3 - (x-3))^2 - \pi(3-1)^2] dx$$

$$= \int_1^2 \pi [4x^2 - 4] dx + \int_2^4 \pi (x^2 - 12x + 16 - 4) dx$$

(a)

$$V = \int_1^2 \pi (4x^2 - 4) dx + \int_2^4 \pi (x^2 - 12x + 12) dx$$

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Cylindrical shells: $V = \int_{-1}^1 2\pi (3-y) \left[y+3 - \left(-\frac{1}{2}y + \frac{3}{2}\right) \right] dy$

$$= \int_{-1}^1 2\pi (3-y) \left[y+3 + \frac{1}{2}y - \frac{3}{2} \right] dy$$

$$= \int_{-1}^1 2\pi (3-y) \left(\frac{3}{2}y + \frac{3}{2} \right) dy$$

$$= \int_{-1}^1 \pi (3-y) (3y+3) dy$$

$$\boxed{V = \int_{-1}^1 \pi (-3y^2 + 6y + 9) dy} \quad (a ii)$$

$$V = \int_{-1}^1 \pi (-3y^2 + 6y + 9) dy$$

$$= \pi \left(-y^3 + 3y^2 + 9y \right) \Big|_{-1}^1$$

$$= \left[\pi (-(-1)^3 + 3(-1)^2 + 9(-1)) \right] - \left[\pi (-(-1)^3 + 3(-1)^2 + 9(-1)) \right]$$

$$= \pi(-1 + 3 + 9) - \pi(1 + 3 - 9)$$

$$\boxed{V = \frac{11\pi}{1} + 5\pi} \quad (b)$$