

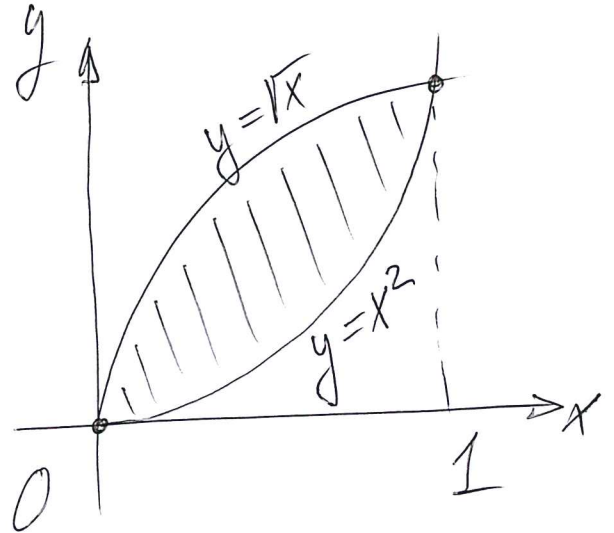
1.3.28

3MS

$$2) \sqrt{x} = x^2 \Leftrightarrow x = x^4 \Leftrightarrow x(x^3 - 1) = 0$$

$$\Leftrightarrow x = 0 / x = 1$$

$$V = \pi \int_0^1 (\sqrt{x})^2 dx - \pi \int_0^1 (x^2)^2 dx$$



$$\int_0^1 x dx = \frac{1}{2} x^2 \Big|_0^1 = \frac{1}{2}$$

$$\int_0^1 x^4 dx = \frac{1}{5} x^5 \Big|_0^1 = \frac{1}{5}$$

$$\Rightarrow V = \pi \cdot \left(\frac{1}{2} - \frac{1}{5} \right) = \frac{3\pi}{10}$$

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3MS

$$b) f(x) = g(x) \Leftrightarrow x^2 - 2x + 6 = -x^2 + 10$$

$$\Leftrightarrow 2x^2 - 2x - 4 = 0 \Leftrightarrow x^2 - x - 2 = 0$$

$$\Leftrightarrow x = \frac{1 \pm \sqrt{1+8}}{2} = \frac{1 \pm 3}{2} \begin{matrix} 2 \\ -1 \end{matrix}$$

$$V = \pi \cdot \left(\int_{-1}^2 f^2(x) dx - \int_{-1}^2 g^2(x) dx \right)$$

$$\begin{aligned} f^2(x) &= x^4 + 4x^2 + 36 - 4x^3 - 24x + 12x^2 \\ &= x^4 - 4x^3 + 16x^2 - 24x + 36 \end{aligned}$$

$$g^2(x) = x^4 - 20x^2 + 100$$

$$\int f^2(x) dx = \frac{x^5}{5} - x^4 + \frac{16x^3}{3} - 12x^2 + 36x + C$$

$$\int g^2(x) dx = \frac{x^5}{5} - \frac{20x^3}{3} + 100x + C$$

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MS

$$b) \int_{-1}^2 f^2(x) dx - \int_{-1}^2 g^2(x) dx$$

$$= \int_{-1}^2 (f^2(x) - g^2(x)) dx$$

$$= -x^4 + \frac{36}{3}x^3 - 12x^2 - 64x \Big|_{-1}^2$$

$$= \overbrace{-16 + 96}^{-96} - 48 - 128 - \underbrace{(-1 - 12 - 12 + 64)}_{39}$$

$$= -135$$

$$\Rightarrow V = 135\pi$$