

شماره ۱

سازمان پستی وزارت فرهنگ و ارشاد اسلامی

الف) $f(x) = 2 \sin^2(x + \frac{\pi}{3}) - 1$

$$-1 \leq \sin(x + \frac{\pi}{3}) \leq 1 \rightarrow 0 \leq \sin^2(x + \frac{\pi}{3}) \leq 1$$

$$0 \leq 2 \sin^2(x + \frac{\pi}{3}) \leq 2$$

$$-1 \leq 2 \sin^2(x + \frac{\pi}{3}) - 1 \leq 1$$

$$Rf = [-1, 1]$$

ب) $g(x) = 3 \cos^2 x - 4$

$$-1 \leq \cos x \leq 1$$

$$-1 \leq \cos^2 x \leq 1$$

$$-3 \leq 3 \cos^2 x \leq 3$$

$$-7 \leq 3 \cos^2 x - 4 \leq -1 \rightarrow Rf = [-7, -1]$$

$[-3, 3]$ $y = \frac{x}{|x|} + [x]$

$$-3 \leq x < -2 \rightarrow |x| = -x \rightarrow -1 \rightarrow y = -4$$

$$-2 \leq x < -1 \rightarrow y = -3$$

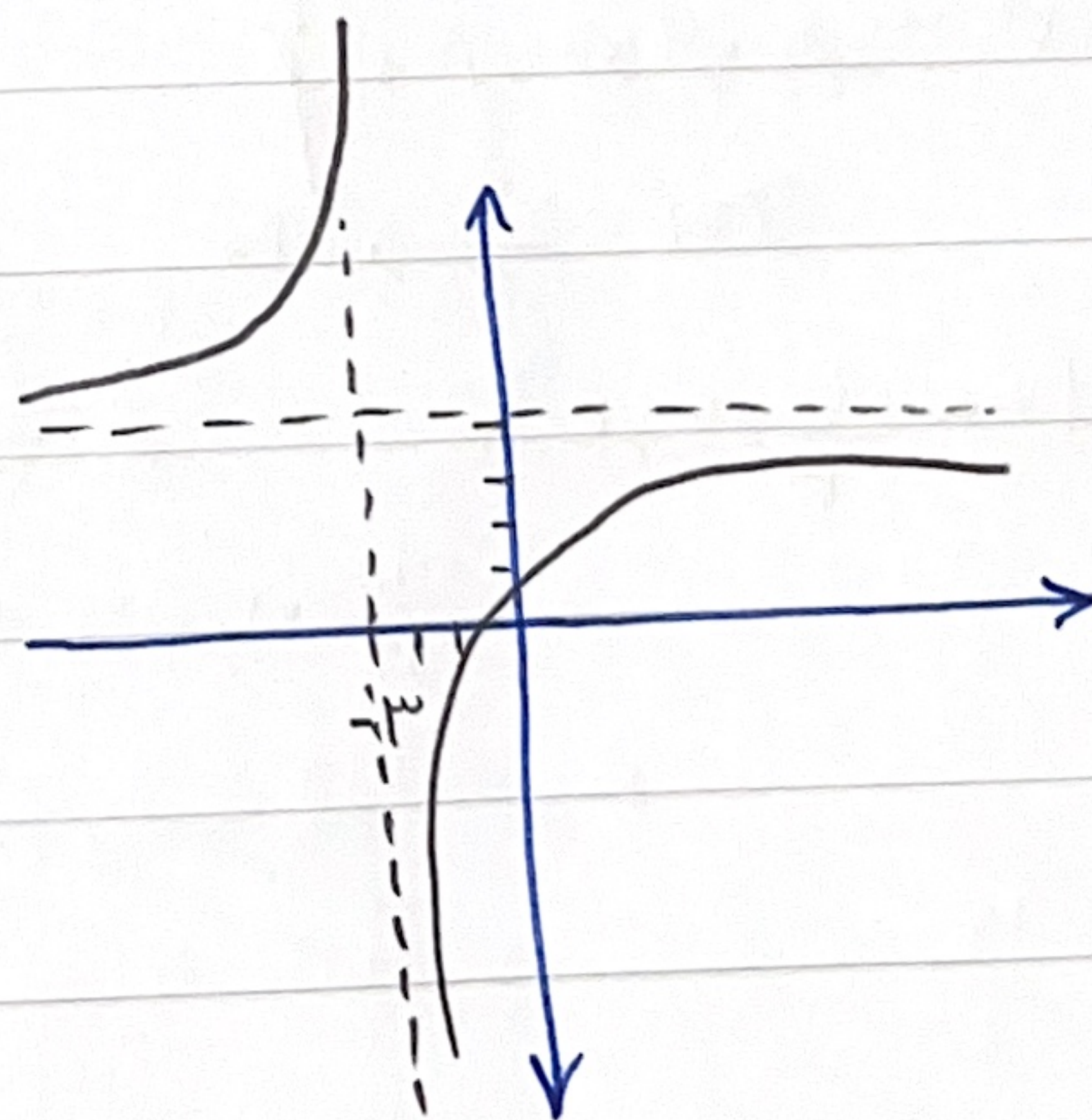
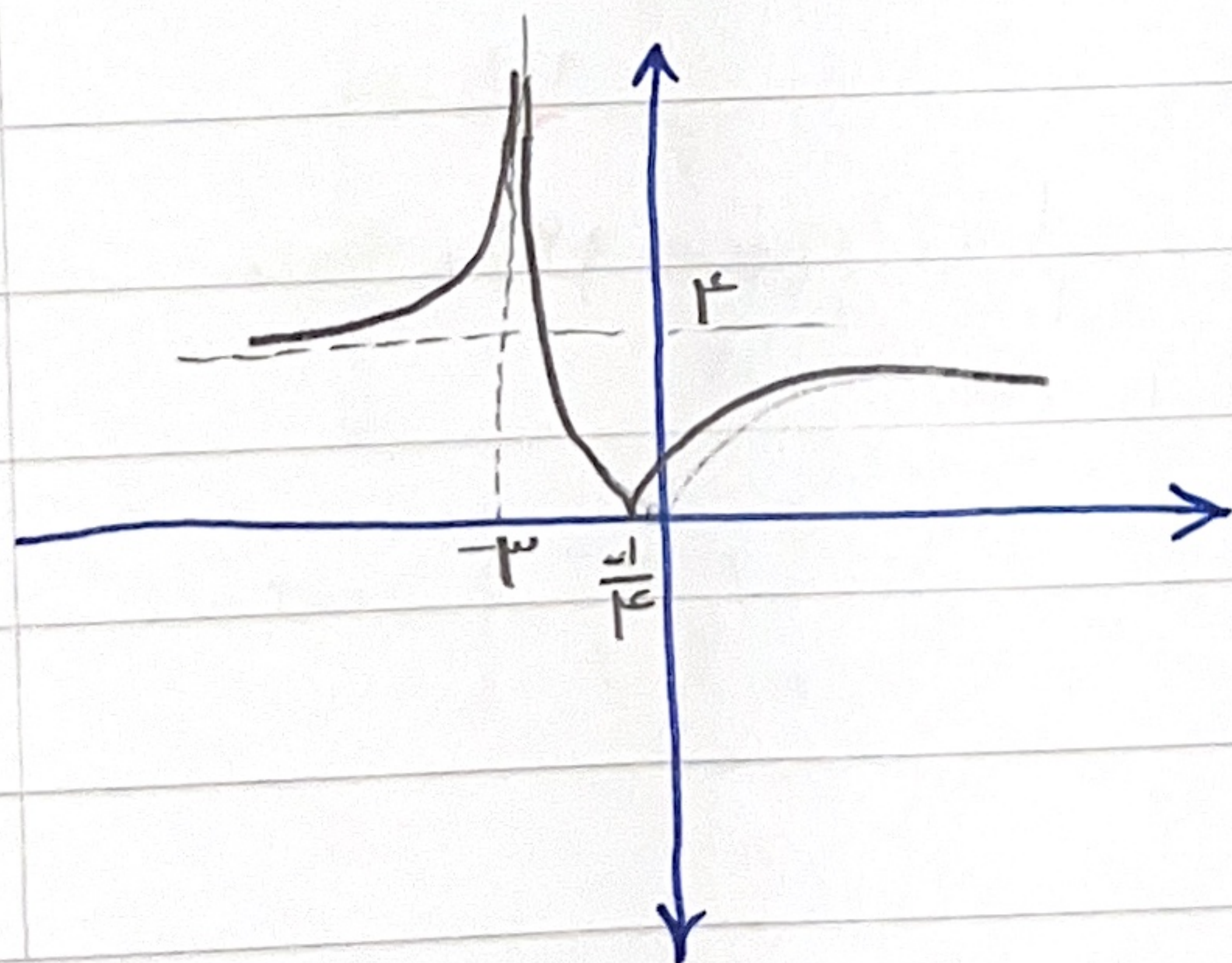
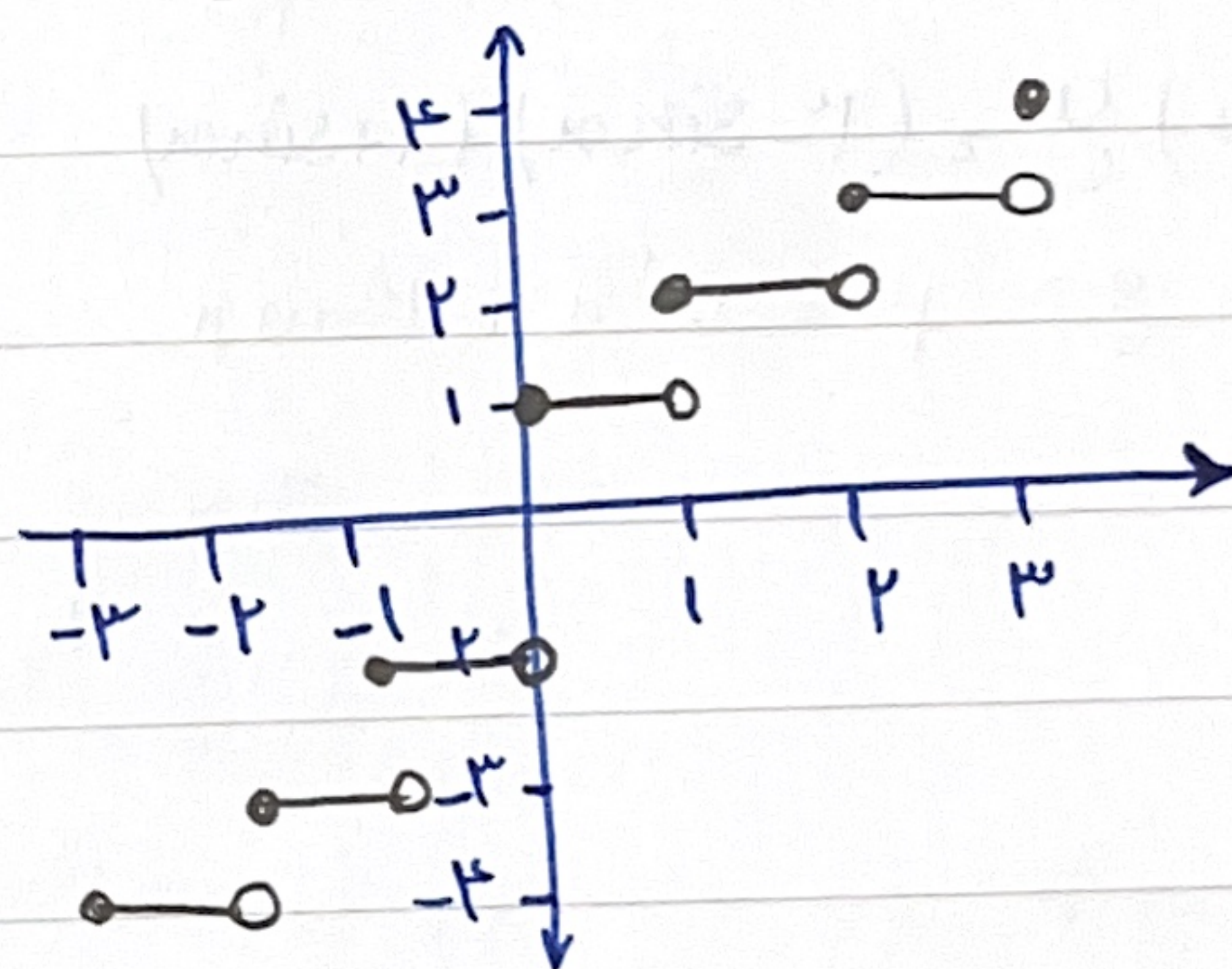
$$-1 \leq x < 0 \rightarrow y = -2$$

$$0 \leq x < 1 \rightarrow y = -1$$

$$1 \leq x < 2 \rightarrow y = 0$$

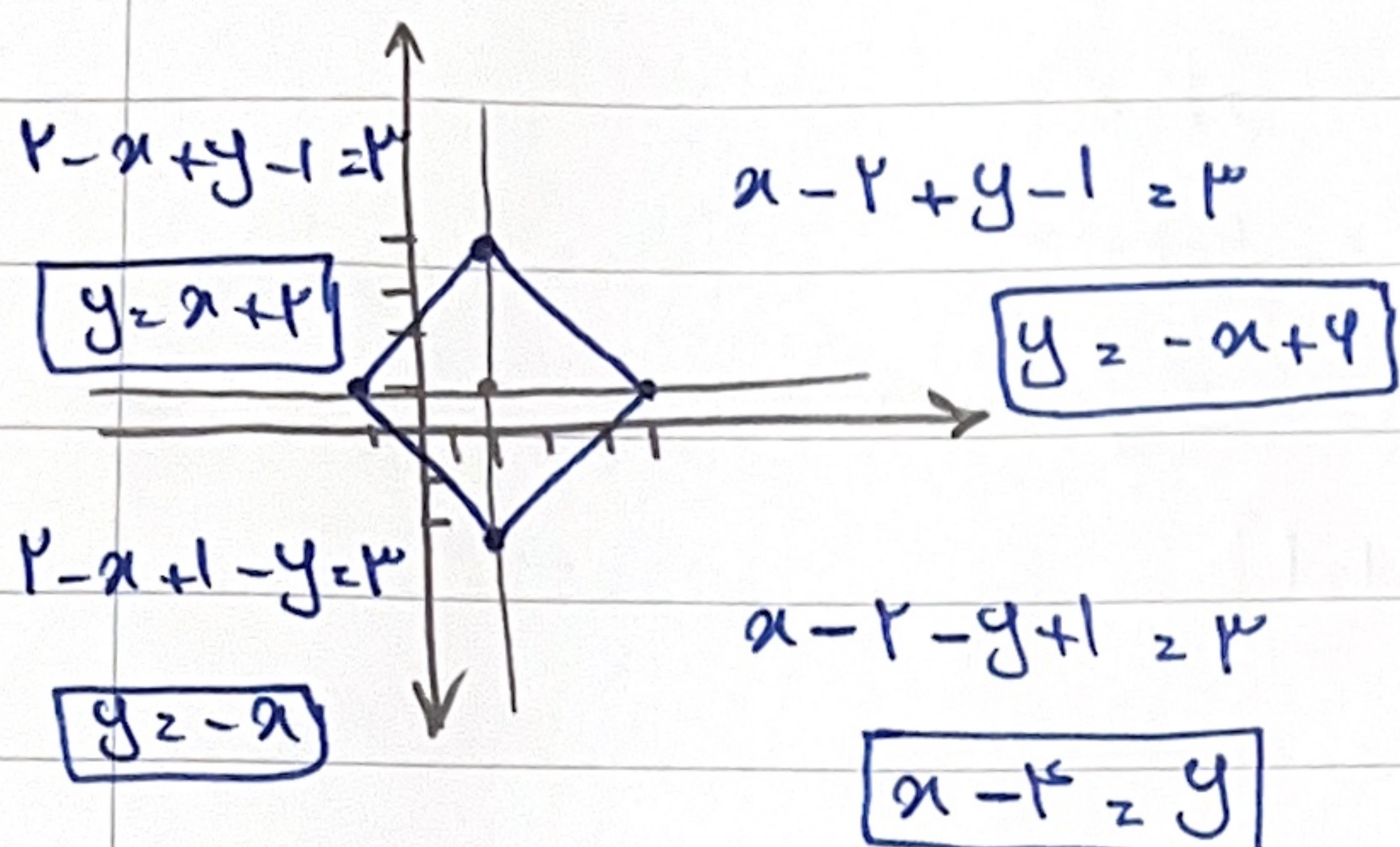
$$2 \leq x < 3 \rightarrow y = 1$$

$$x = 3 \rightarrow y = 2$$



$$|x-r| + |y-1| = r$$

(K)



الف) $f(x) = x + \frac{1}{x} + r\sqrt{x + \frac{1}{x}} \leadsto x + \frac{1}{x} \geq 0$ (A)

$$x > 0 \rightarrow x + \frac{1}{x} \geq r$$

$$\left(\sqrt{x + \frac{1}{x}}\right)^r + r\sqrt{x + \frac{1}{x}}$$

$$\sqrt{x + \frac{1}{x}} \begin{cases} \xrightarrow{+\infty} r + r\sqrt{r} \\ \xrightarrow{-b/ra = -r/p = -1} x \end{cases}$$

$$Rf = [r + r\sqrt{r}, +\infty)$$

ب) $y = (r - \sin \alpha)(1 + \sin \alpha)$

$$y = r - \sin^2 \alpha + r \sin \alpha \rightarrow y = -\sin^2 \alpha + r \sin \alpha + r$$

$$\sin \alpha \begin{cases} \xrightarrow{(1) \rightarrow (K)} \\ \xrightarrow{(1) \rightarrow -1 - r + r = 0} \\ \xrightarrow{-b/ra = -r/r = -1} (1) \quad -1 + r + r = (K) \end{cases}$$

$$Rf = [0, r]$$

$\{1, r, r, r, \infty, 4, 4, 4, 4\}$

(9)

$$f(x) = \frac{1}{x}x + 10$$

$$\frac{1}{x} \times 1 + 10 + \frac{1}{x} \times r + 10 + \dots + \frac{1}{x} \times 4 + 10 = \frac{1}{x} \times (1 + r + \dots + 4) + 4 \times 10$$

$$= \frac{1}{x} \times (r\omega) + 40 \geq 40 - 10 = 10$$

$$f(x) = \sqrt{ax^2 + bx + c} \leadsto ax^2 + bx + c \geq 0$$

← این رابطه فقط برای $x \geq 2$ برقرار

⑤

$a = 0$ ← رابطه خطی است

$$\underline{x} = 2$$

$$\sqrt{3b + c} = 1 \rightarrow 3b + c = 1, 2b + c = 0$$

$$\begin{cases} 3b + c = 1 \\ 2b + c = 0 \end{cases} \rightarrow b = 1, c = -2 \rightarrow g(x) = \sqrt{x^2 + 1}$$

$$Rg = \sqrt{[1, +\infty)} = [1, +\infty) \quad \min \Big|_1^0$$

$$y = \sqrt[3]{x^3 + ax^2 + bx - 1} \xrightarrow{\text{تفاضل}} y = \sqrt[3]{(x-1)^3}$$

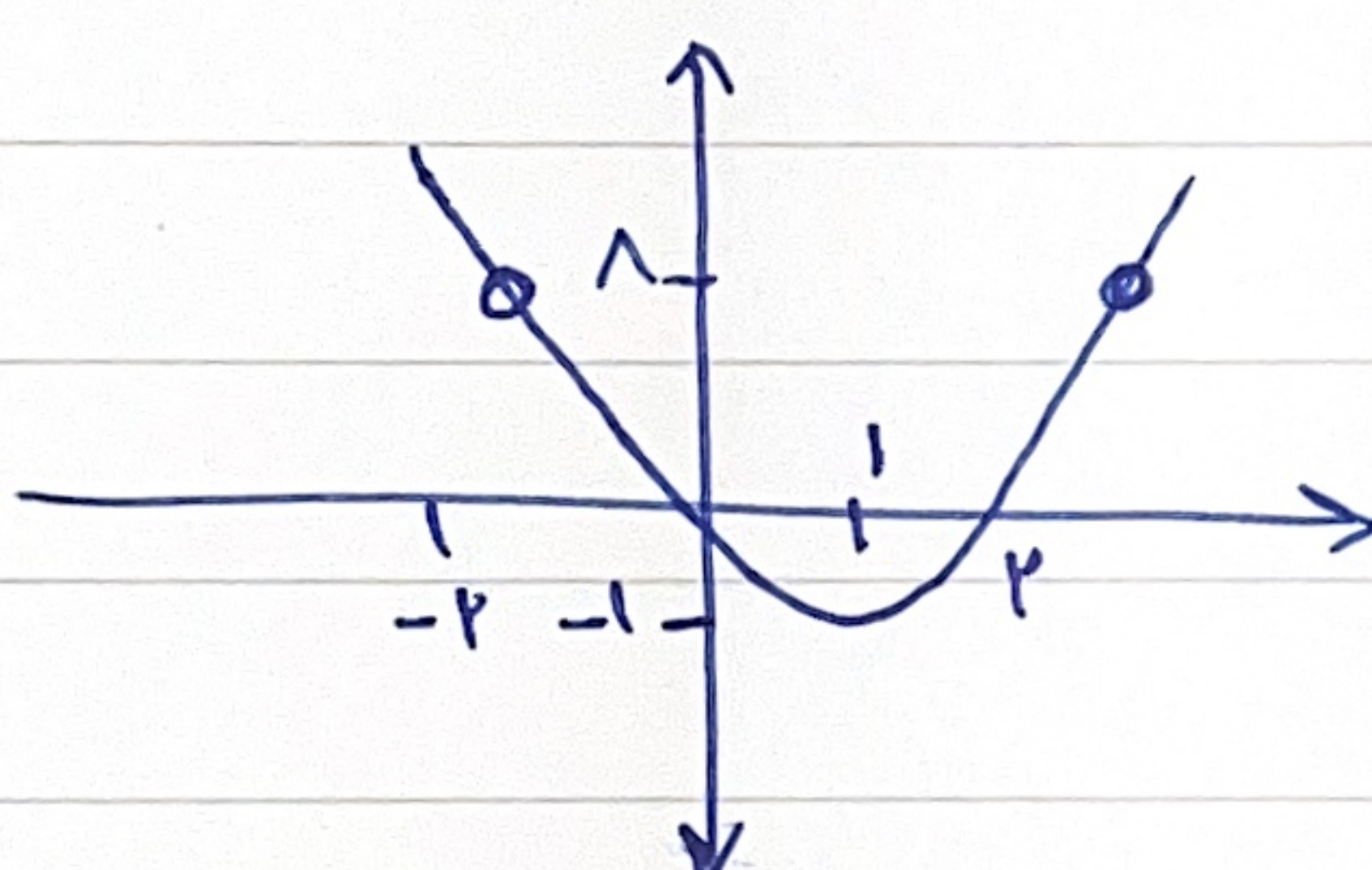
④

$$\sqrt[3]{x^3 - 4x^2 + 11x - 1} \rightarrow a = -4, b = 11$$

$$-4 \leq x \leq 11 \rightarrow -1 \leq x - 1 \leq 10 \rightarrow Rf = [-1, 10]$$

$$f(x) = \frac{x^3 - 11x}{x + 1} = \frac{x(x-1)(x+1)}{(x+1)} = \boxed{x \neq -1} \rightarrow x^2 - x$$

①



$$x^2 - x = 1$$

$$x^2 - x - 1 = 0 \rightarrow (x-1)(x+1) = 0$$

$$x = 1, x = -1$$

$$\{a, b\} = \{-1, 1\}$$

$$f\left(\frac{a+b}{2}\right) = f(0) = 1 + 1 = 2$$

$$\min \Big| \frac{1+1}{2} = 1 \rightarrow Rf = [-1, +\infty) \rightarrow C = -1$$