

①

اینارکرم زاده - تظیف ۵ - (دارم هم اضطرر B

$$y = \frac{|x|+1}{|x|-1} \rightarrow |x| = \frac{y+1}{y-1} \quad \begin{array}{c} -\frac{1}{1} \\ + \frac{1}{-1} \end{array} \rightarrow R_y = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$$

$$b) y = \frac{x^2+1}{|x|} = |x| + \frac{1}{|x|} \rightarrow R_y = [2, +\infty)$$

②

$$y = \frac{x^2+1}{x+1} \rightarrow yx+1^2y = x^2+1x-1 \rightarrow 0 = x^2+(1-y)x-1-1^2y$$

$$\rightarrow x = \frac{y-1 \pm \sqrt{(y-1)^2 + 4(1+1^2y)}}{2} \geq 0 \rightarrow y^2 - 4y + 1 + 1^2y \geq 0$$

$$\begin{array}{c} -4 \\ + \frac{1}{-1} \end{array}$$

$$y^2 + 1^2y + 1 \geq 0 \rightarrow (y+1)(y+1) \geq 0$$

$$\rightarrow R_y = \mathbb{R} - (-4, -1)$$

③

$$f(x) = \frac{x^2-x+\frac{1}{x}}{x^2-x+1} = y \rightarrow D_f = \mathbb{R}$$

$$\hookrightarrow yx^2 - yx + y = x^2 - x + \frac{1}{x} \rightarrow (y-1)x^2 + (1-y)x + y - \frac{1}{x} = 0$$

$$y \neq 1 \rightarrow x = \frac{y-1 \pm \sqrt{(1-y)^2 - 4(y-1)(y-\frac{1}{x})}}{2(y-1)} \geq 0 \rightarrow y^2 - 2y + 1 - 4y^2 - 1 + 4y \geq 0$$

$$\hookrightarrow 3y^2 - 3y \leq 0 \rightarrow (y-\sqrt{3})(y+\sqrt{3}) \leq 0$$

$$y=1 \rightarrow x^2-x+1 = x^2-x+\frac{1}{x} \rightarrow 1 \neq \frac{1}{x} \quad \text{وَقَدْ}$$

$$\begin{array}{c} -\sqrt{3} \\ + \frac{1}{-1} \end{array}$$

$$R_f = [-\sqrt{3}, \sqrt{3}]$$

الف) $y = \sqrt{-x^2 + 4x - 1}$

$\hookrightarrow \frac{-b}{2a} = \frac{-4}{-2} = 2 \hookrightarrow \sqrt{-4 + 16 - 1} = \sqrt{11}$

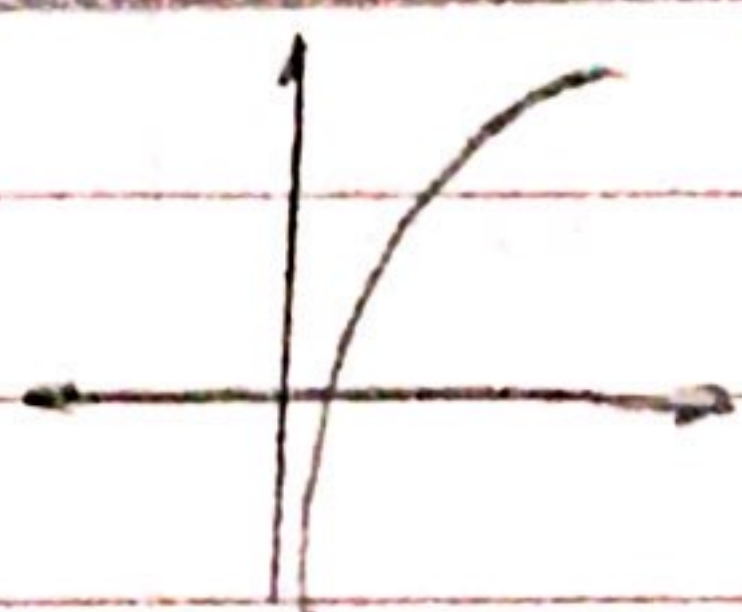
$\rightarrow R_y = [0, \sqrt{11}]$

ب) $y = \sqrt[3]{x^2 - 16x}$

$\frac{-b}{2a} = \frac{16}{2} = 8 \rightarrow (-8)$

$\rightarrow R_y = [-8, +\infty)$

الف) $y = \log(x^2 - x + 16) > 0$



$\rightarrow R_y = \mathbb{R}$

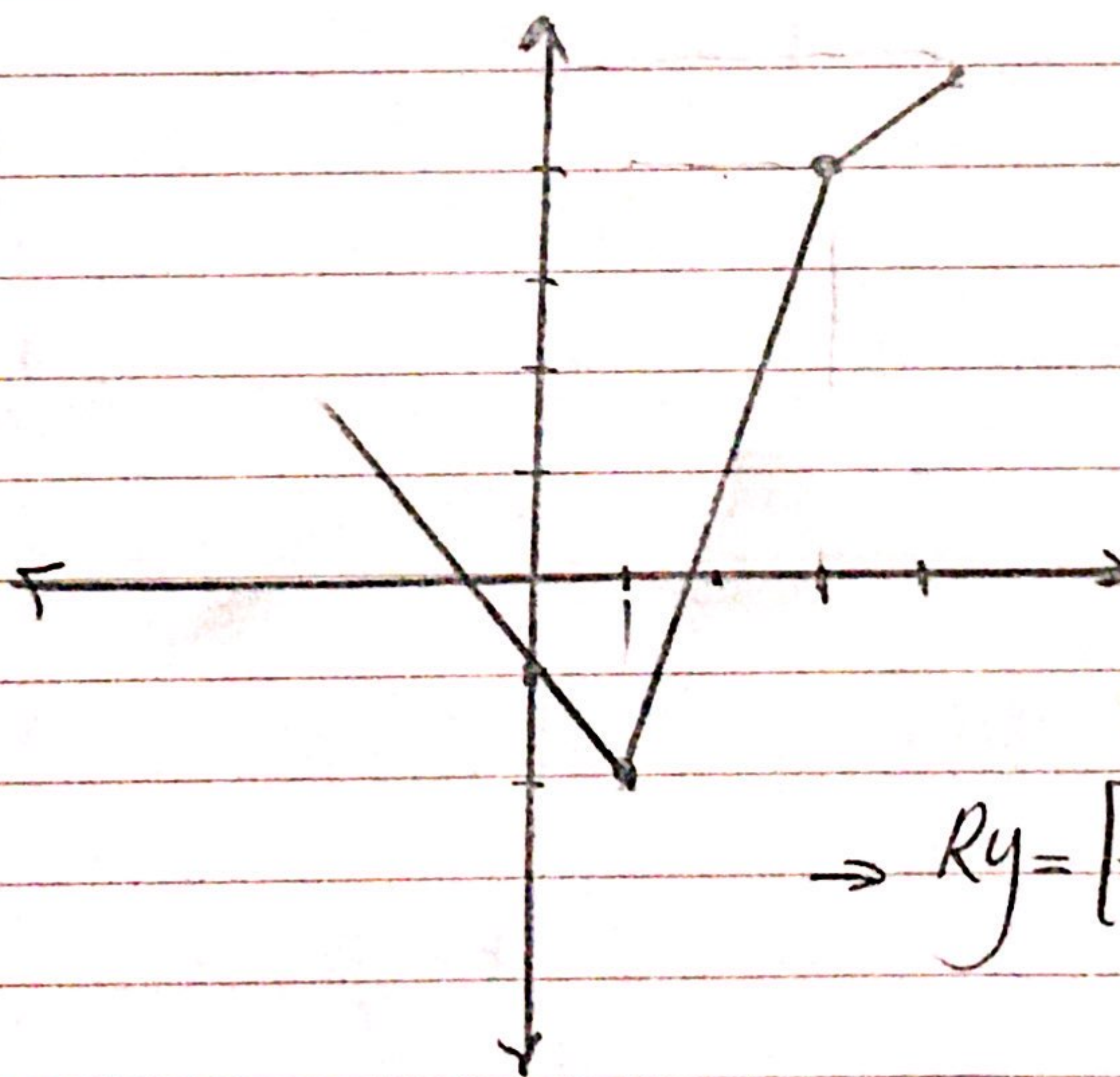
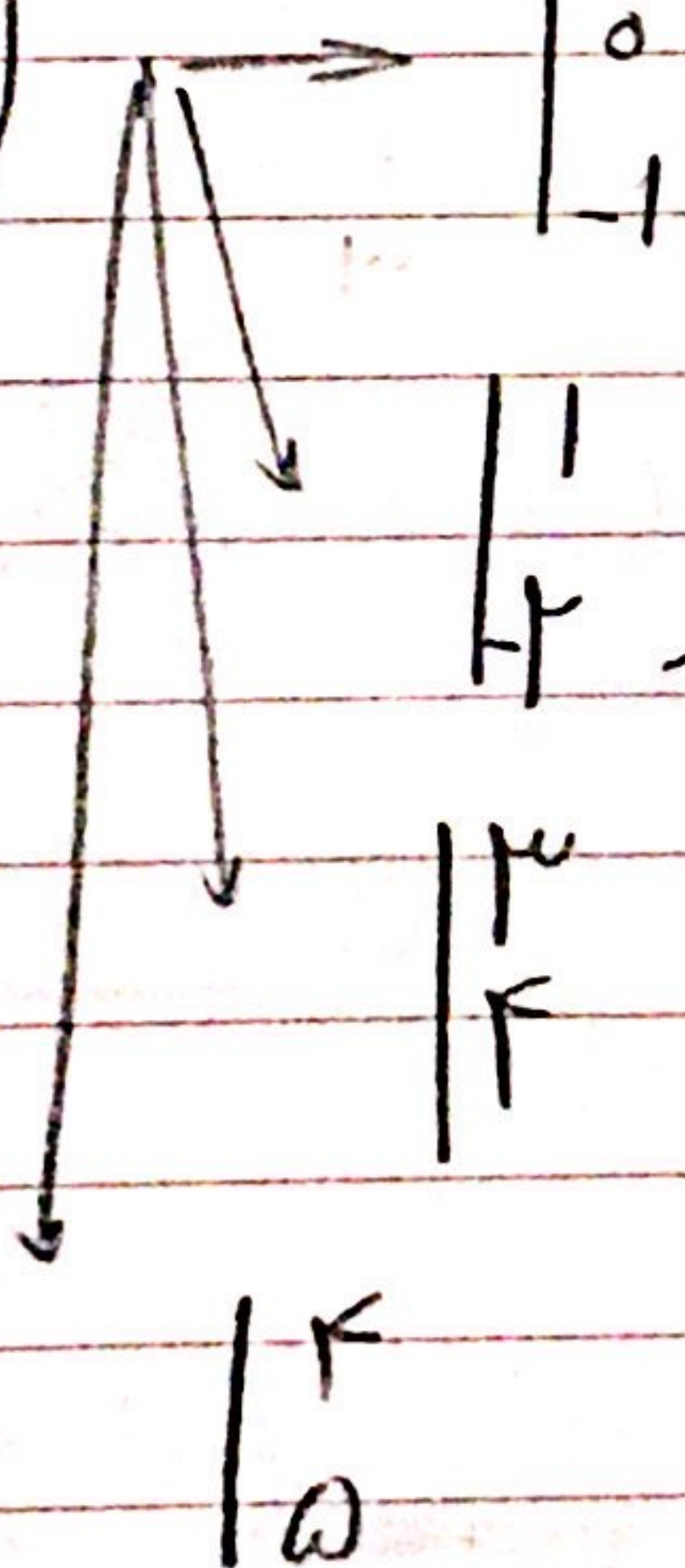
د) ۱

ب) $y = \log\left(\frac{x^2+1}{x}\right)$

$\rightarrow \frac{x^2+1}{x} > 0 \rightarrow x > 0 \rightarrow x + \frac{1}{x} \geq 2 \rightarrow \log 2 = 1$

$\log + \infty = +\infty \rightarrow R_y = [1, +\infty)$

الف) $|x-2| - |x+4| = y$



$\rightarrow R_y = [-6, 6]$

د) ۲

ب) $y = |x-3| + |x+1| \rightarrow$

$R_y = [4, +\infty)$

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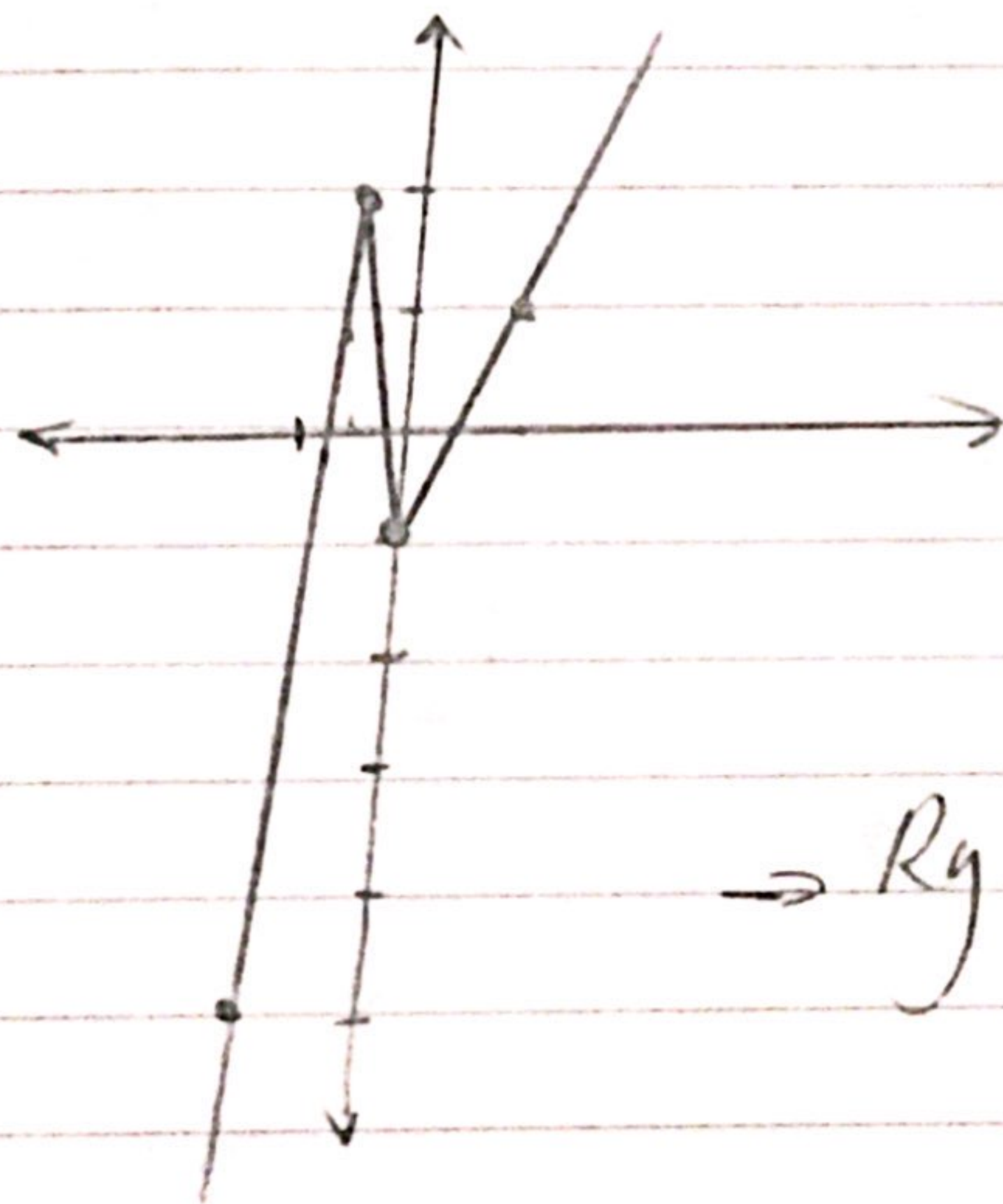
$$|x-2| - |x+2| \leq 1$$

$x < -2$	$-2 \leq x < 2$	$x \geq 2$
$-x+2-x+2 = -2x+4 \leq 1$ $-2x \leq -3$ $x \geq \frac{3}{2}$	$-x+2-x-2 = -2x \leq 1$ $-2x \leq 1$ $x \geq -\frac{1}{2}$	$x-2-x-2 = -x-4 \leq 1$ $-x \leq 5$ $x \geq -5$

$\rightarrow (-\infty, -\frac{3}{2}] \cup [-\frac{1}{2}, +\infty)$

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

Graph of the function $y = |x| - |x+1| + |x|$ is shown, with key points marked at $x = -1, 0, 1$.

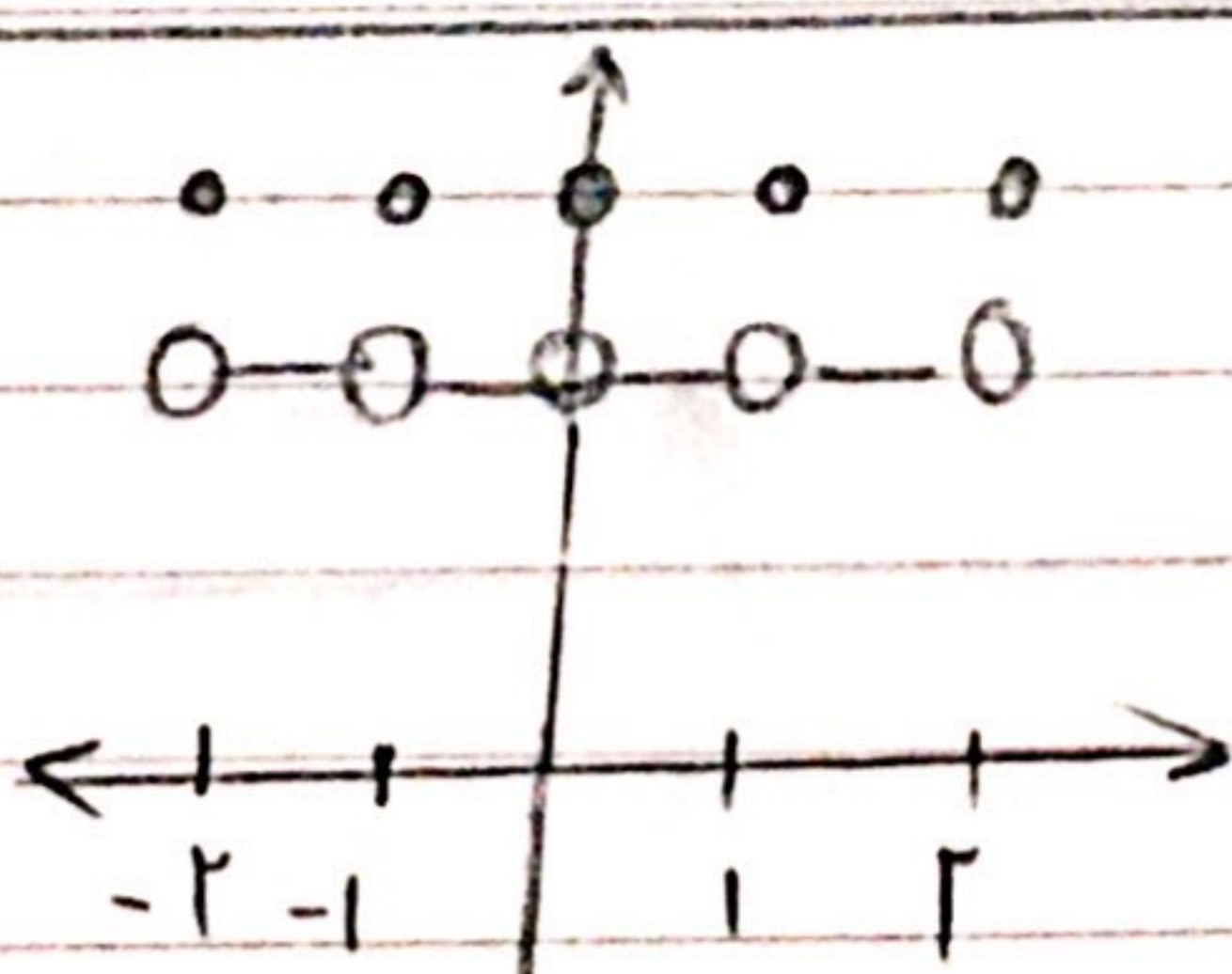


$\rightarrow R_y = \mathbb{R}$

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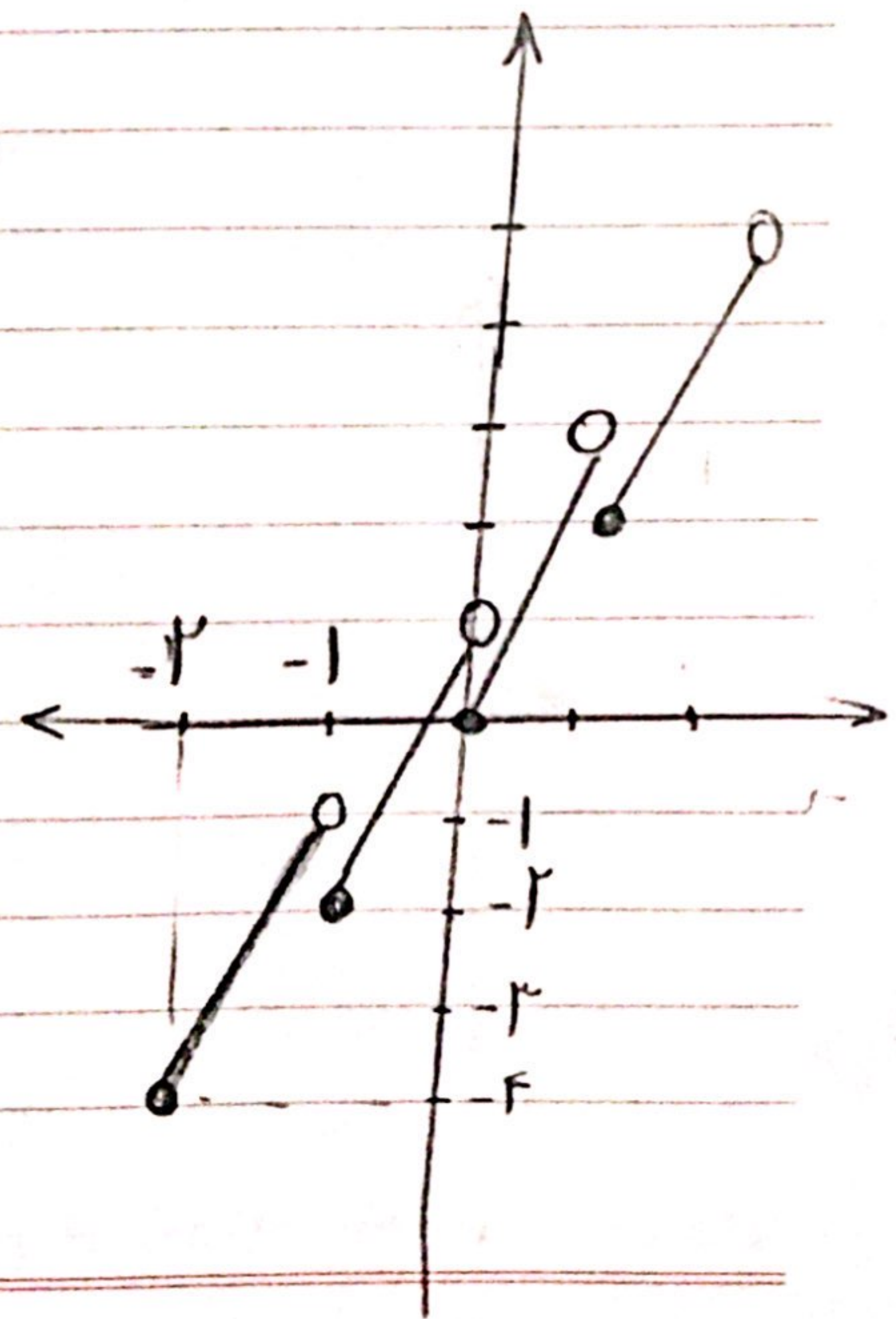
١) $[x] + [-x] + 2 = y$

$\hookrightarrow R_y = \{2, 3\}$



٢) $y = |x| - [x]$

Graph of the function $y = |x| - [x]$ is shown, with key points marked at $x = -2, -1, 0, 1, 2$.



$R_y = [-1, 0)$



الف) $y = \sin^2 - \sin + 1$ $\xrightarrow{1} 1 - 1 + 1 = 1$

$\xrightarrow{-1} 1 + 1 + 1 = 3$

$\xrightarrow{-\frac{b}{2a}} \frac{1}{4} - \frac{1}{4} + 1 = \frac{3}{4}$

$\rightarrow Rg = \begin{bmatrix} 1 & 3 \\ 1 & 3 \end{bmatrix}$

ب) $y = (\sin^2)^2 + \sin^2 + 1$ $\xrightarrow{1} 1 + 1 + 1 = 3$

$\xrightarrow{0} 1$

$\rightarrow Rg = \begin{bmatrix} 1 & 3 \end{bmatrix}$

$\xrightarrow{-\frac{b}{2a} = -\frac{1}{2}} \text{عق}$