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$$|x_k - 3| - |x + 2| = k$$

$$f(x) \begin{cases} -x + \omega & x < -2 \\ -x + 1 & -2 \leq x < 1 \\ x - \omega & x \geq 1 \end{cases} \Rightarrow \begin{cases} -x + \omega = 9 \Rightarrow x = -2 \\ -x + 1 = 9 \Rightarrow x = -2 \\ x - \omega = 9 \Rightarrow x = 1 \end{cases} \Rightarrow k = 9$$

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الف) $y = 3x - [3x] \Rightarrow Rf = [0, 1)$
 ب) $y = x - [x] \Rightarrow Rf = [0, 1)$
 ج) $y = x - \omega \left[\frac{x}{\omega} \right] \Rightarrow Rf = \mathbb{I}$
 د) $y = [3x] - 3x \Rightarrow -(3x - [3x]) \Rightarrow [-1, 0]$

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$x(-) \circ \leq @ < 1$

الف) $P \sin x + P \cos x \Rightarrow R_f = [-\sqrt{2}, \sqrt{2}] \Rightarrow R_f = [-\sqrt{2}, \sqrt{2}]$

ب) $P \sin x - P \cos x \Rightarrow R_f = [-2, 2]$

ج) $[P \sin x + \omega \cos x] \Rightarrow R_f \Rightarrow [-\sqrt{P^2 + \omega^2}, \sqrt{P^2 + \omega^2}] \Rightarrow R_f = [-2, 2]$

د) $y = \sqrt{\cos x - P \sin x} \Rightarrow R_f = [-\sqrt{2}, \sqrt{2}] \Rightarrow R_f = [-2, 2]$

الف) $y = \sin^2 x + P \sin x + P \Rightarrow -\frac{b}{2a} = -\frac{P}{2} \Rightarrow (-\frac{P}{2})^2 + P(-\frac{P}{2}) + P$
 $\Rightarrow \frac{P}{4} - \frac{P}{2} + P \Rightarrow \frac{P}{4} - \frac{2P}{4} + \frac{4P}{4} = \frac{3P}{4} \Rightarrow \min \Rightarrow \sin x = 1 \Rightarrow y = P \Rightarrow R_f = [P, 4P]$

ب) $y = P \sin^2 x + P \sin x + P \Rightarrow -\frac{b}{2a} = -\frac{P}{2} \Rightarrow P(-\frac{P}{2})^2 + P(-\frac{P}{2}) + P$
 $\Rightarrow P \frac{P}{4} - \frac{P}{2} + P \Rightarrow \frac{P^2}{4} - \frac{2P}{4} + \frac{4P}{4} \Rightarrow \frac{P^2 - 2P + 4P}{4} \Rightarrow \frac{P^2 + 2P}{4} \Rightarrow \min \Rightarrow \sin x = 1 \Rightarrow y = P$
 $\Rightarrow R_f = [\frac{P}{4}, P]$

الف) $y = \sin^2 x + \epsilon \cos^2 x \Rightarrow y = \sin^2 x + \epsilon(1 - \sin^2 x) \Rightarrow y = \sin^2 x + \epsilon - \epsilon \sin^2 x \Rightarrow y = \epsilon - P \sin^2 x$
 $\Rightarrow P(1 - \sin^2 x) + 1 \Rightarrow 1 + P \cos^2 x \Rightarrow x = 0 \Rightarrow y = 1$ و $x = 1 \Rightarrow y = \epsilon \Rightarrow R_f = [\epsilon, 1] \Rightarrow -\frac{b}{2a} = 0$

ب) $\frac{P \cot x}{1 + \cot^2 x} \Rightarrow \frac{P \cos}{\sin} \Rightarrow \frac{P \cos}{\sin} \Rightarrow \frac{\cos^2 \sin^2 (P \cos)}{\sin^2 (\sin^2 \cos^2 + \cos^2)} \Rightarrow \frac{P \cos^3}{\cos^2 (\sin^2 + \cos^2)}$
 $\Rightarrow P \cos = y \Rightarrow R_f = [-P, P]$

الف) $y = \sin^2 x + \cos^2 x \Rightarrow R_f = [\frac{1}{2}, 1]$

ب) $y = [\sin^2 x + \cos^2 x] \Rightarrow [\frac{1}{2}, 1] \Rightarrow \text{براکت} \Rightarrow [0, 1]$

الف) $y = \frac{Pn^2 + Pn - 1}{n + \epsilon} \Rightarrow \frac{\frac{1}{2}(Pn + 1)(Pn - 1)}{n + \epsilon} \Rightarrow \frac{(n + \epsilon)(Pn - 1)}{(n + \epsilon)} \Rightarrow Pn - 1$
 $R_f = [R - \{ -1 \}]$

ب) $y = \frac{n^2 - 1}{n - 1} \Rightarrow \frac{(n - 1)(n + 1)}{(n - 1)} \Rightarrow n + 1 \Rightarrow R_f = [R - \{ 1 \}]$

$$y = x + |y - x| \Rightarrow y - x = 0 \Rightarrow y = x$$

~~Handwritten scribbles~~

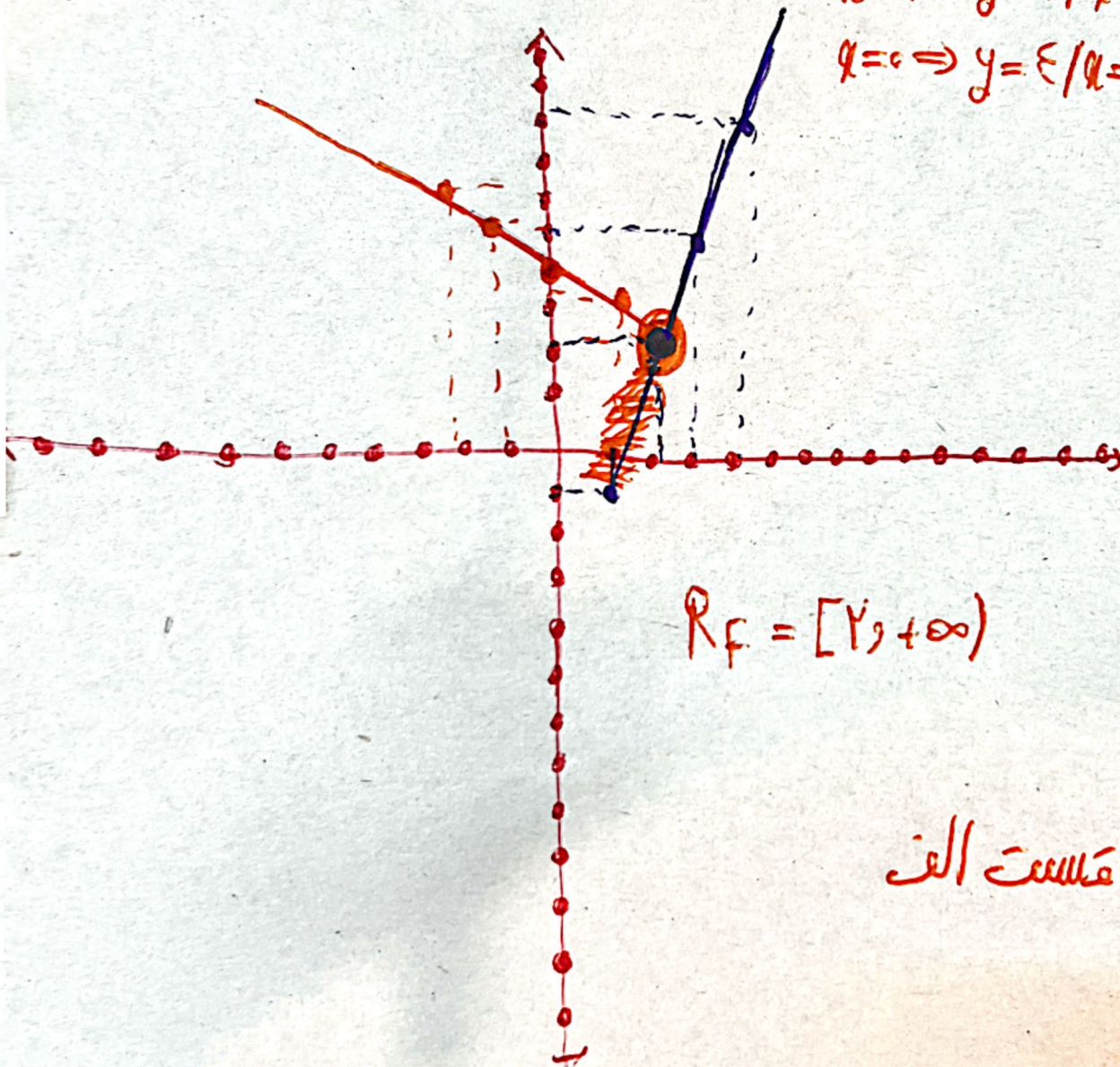
x	y
$-$	$+$

$$x \geq y \Rightarrow x + |x - y| \Rightarrow x + x - y \Rightarrow 2x - y \Rightarrow x = 1 \Rightarrow y = -1 / x = 2 \Rightarrow y = 2$$

$$x \leq y \Rightarrow x + (y - x) \Rightarrow y \Rightarrow x = 3 \Rightarrow y = 0 / x = 2 \Rightarrow y = 1$$

$$x = 2 \Rightarrow y = 2 / x = 1 \Rightarrow y = 2$$

$$x = 0 \Rightarrow y = 2 / x = -1 \Rightarrow y = 0$$



$$R_f = [2, +\infty)$$

لقد ال بك قسست الف

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

$$x=2 \quad x=1 \quad x=0$$

x	0	1	2
$ x $	-	+	+
$ x-1 $	-	-	+
$ x-2 $	-	-	+

لقد اكدت على ان

لقد اكدت على ان

$$① x \leq 0 \Rightarrow 2-x + 1-x + x \Rightarrow 3-x$$

$$② 0 \leq x \leq 1 \Rightarrow 2-x + 1-x - x \Rightarrow 3-3x$$

$$③ 1 \leq x \leq 2 \Rightarrow 2-x + x - 1 - x \Rightarrow 1-x$$

$$④ x \geq 2 \Rightarrow x - 2 + x - 1 - x \Rightarrow x - 3$$

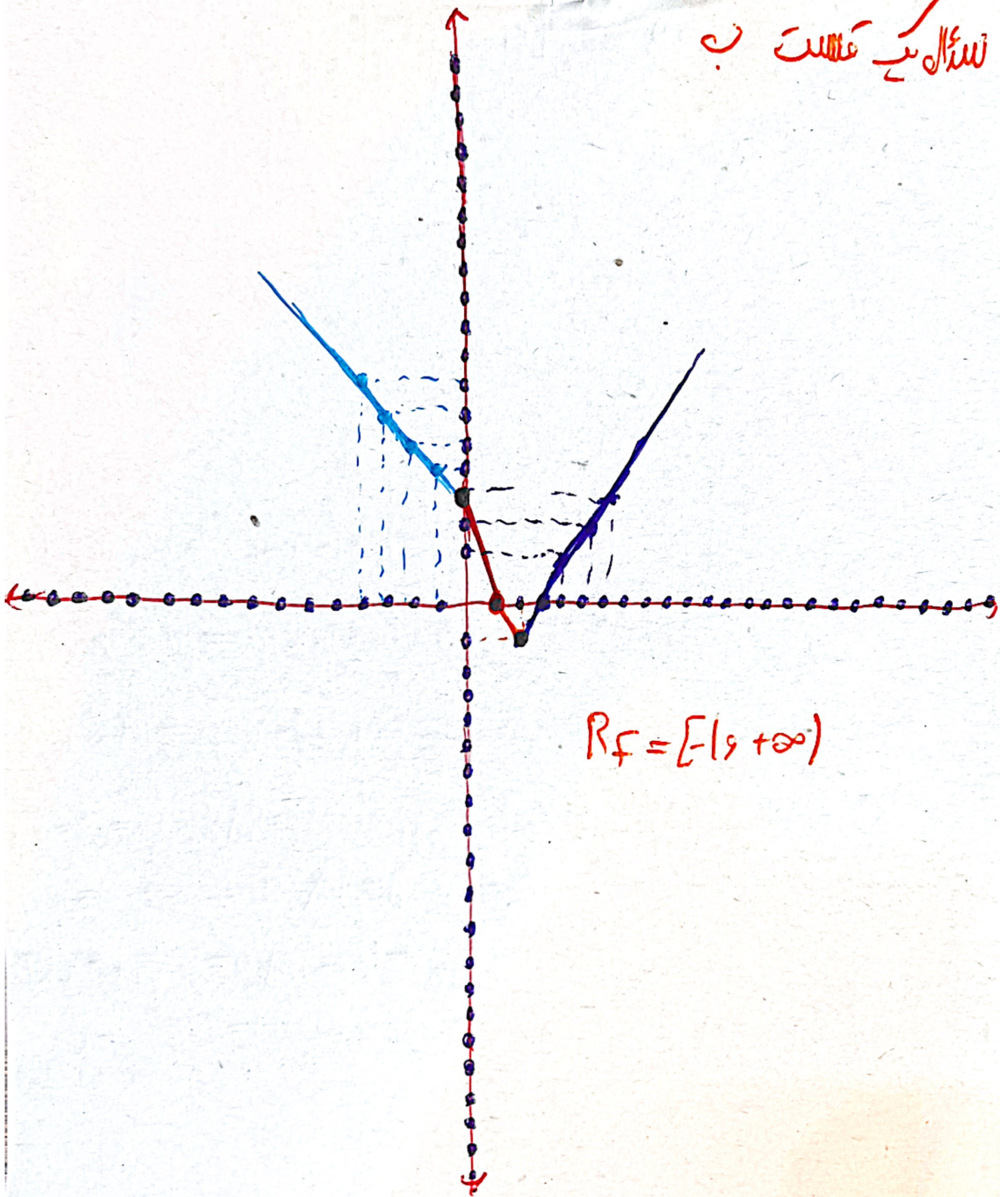
$$① x=0 \Rightarrow y=3/x=-1 \Rightarrow y=6/x=-2 \Rightarrow y=\infty/x=-3/y=7/x=-6 \Rightarrow y=V$$

$$② x=0 \Rightarrow y=3 \neq x=1 \Rightarrow y=0$$

$$③ x=1 \Rightarrow y=0 / x=2 \Rightarrow y=-1$$

$$④ x=2 \Rightarrow y=1/x=3 \Rightarrow y=0/x=6 \Rightarrow y=1/x=7 \Rightarrow y=2/x=7 \Rightarrow y=V$$

سوال کے غلط ب



$$R_f = [-1, +\infty)$$

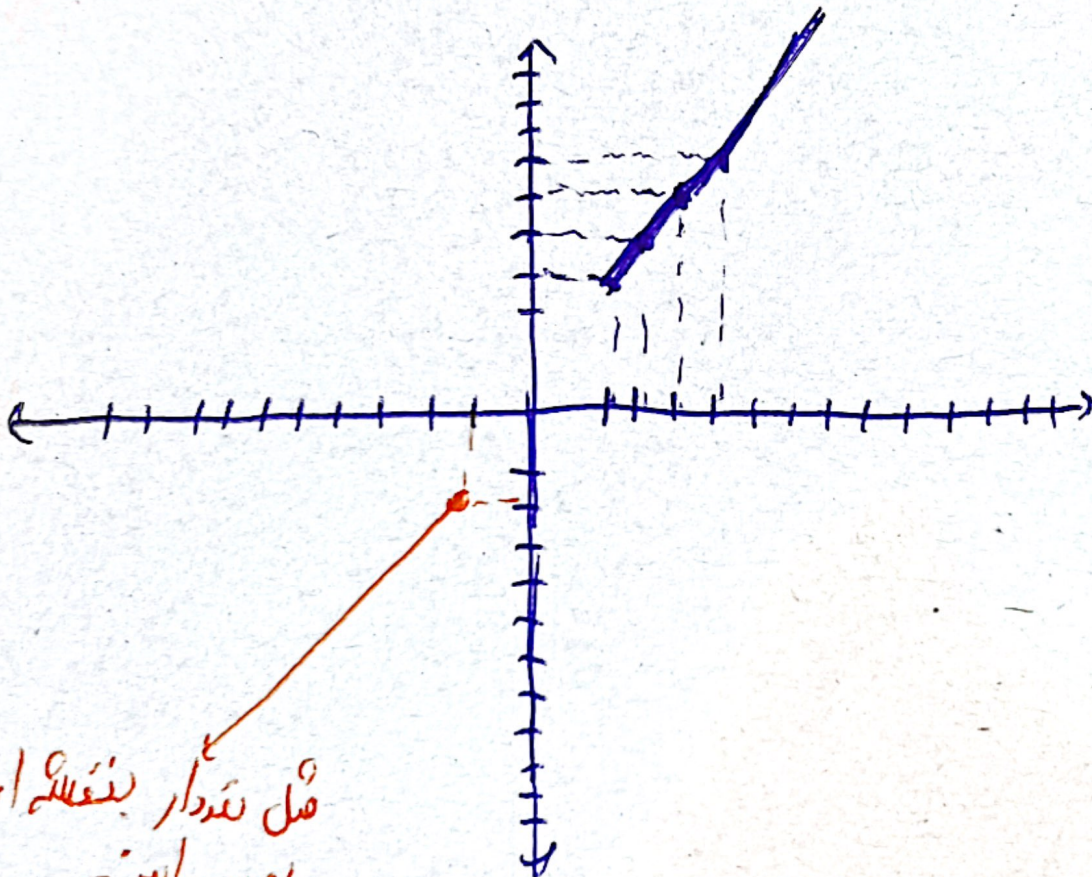
سؤال ٣ الف)

$$y = x + \frac{x}{|x|}$$

$$\frac{x}{|x|} \begin{array}{c|c} x & 0 \\ \hline |x| & - \quad + \end{array}$$

$$x > 0 \Rightarrow x + 1 \Rightarrow x = 1 \Rightarrow y = 2 / x = 2 \Rightarrow y = 3 / x = 2 \Rightarrow y = 4 /$$

$$x < 0 \Rightarrow x - 1 \Rightarrow x = -1 \Rightarrow y = -2 / x = -2 \Rightarrow y = -3 / x = -2 \Rightarrow y = -4 /$$



من مقدار منفصل اما
او به پاسن

المعادلة للمماس

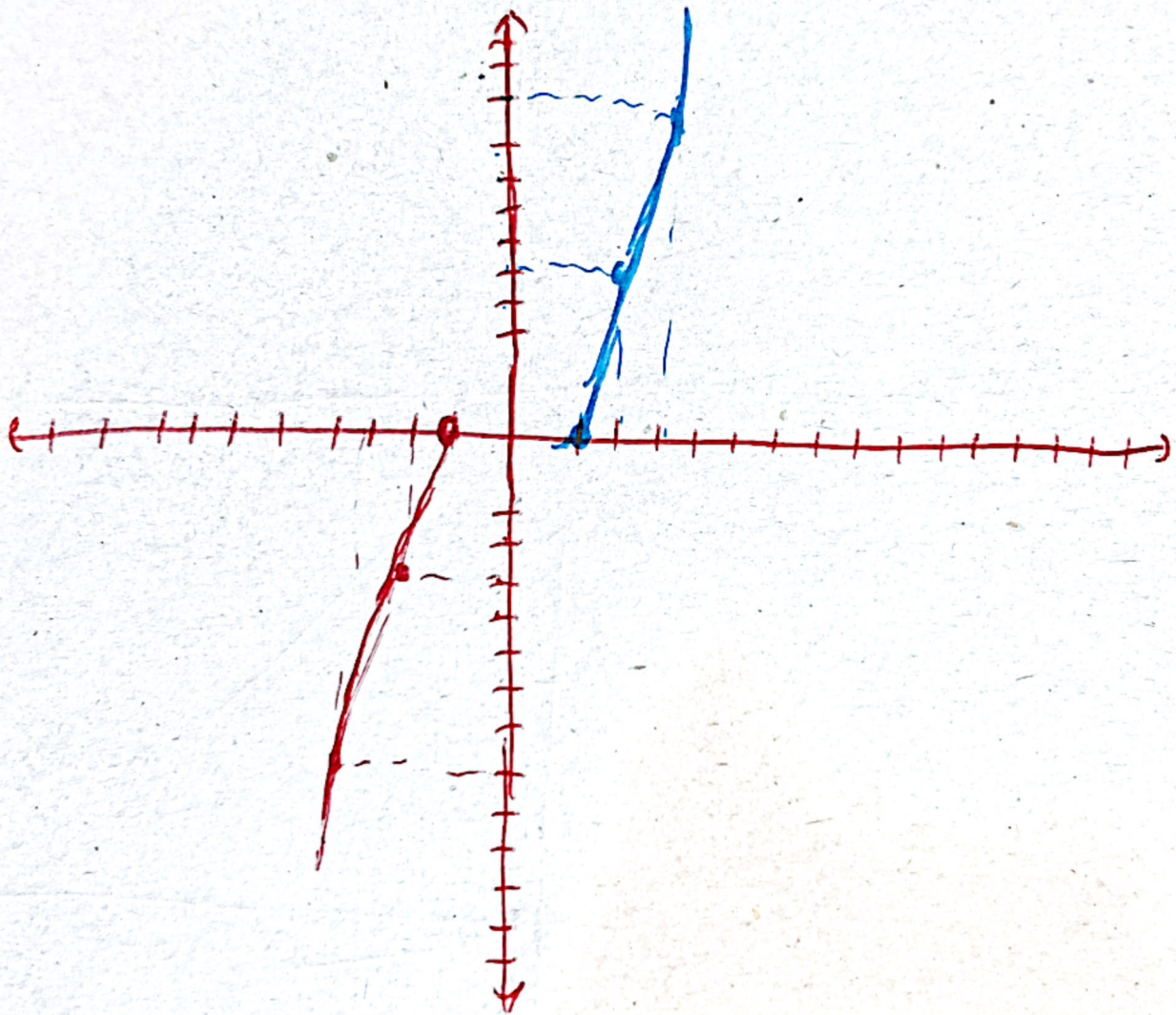
$$y = x|x| - \frac{x}{|x|}$$

$$\frac{x}{|x|} \begin{array}{c} 0 \\ + \quad 0 \quad + \end{array}$$

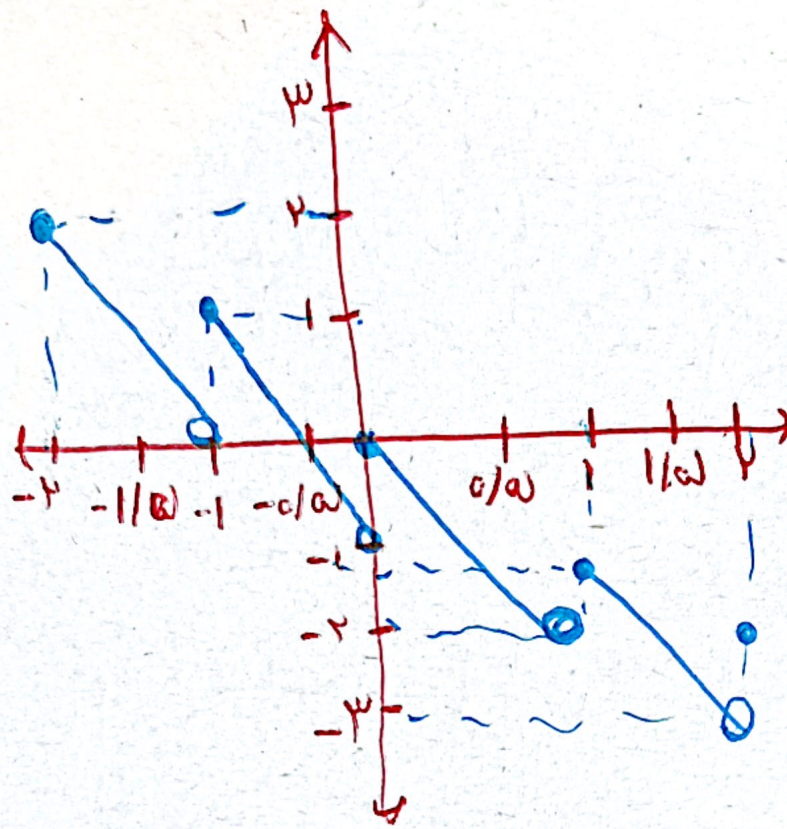
$$x > 0$$

$$x^2 - 1 \Rightarrow x = 1 \Rightarrow y = 0 / x = 2 \Rightarrow y = 3 / x = 3 \Rightarrow y = 1$$

$$x < 0 \Rightarrow -x^2 + 1 \Rightarrow x = -1 \Rightarrow y = 0 / x = -2 \Rightarrow y = -3 / x = -3 \Rightarrow y = 1$$



مسئله ۱
کلاس اول



مسئله ۲
کلاس اول

