

کتابخانه فرهنگ آذربایجان

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الف) $\frac{|x|+1}{|x|-2}$ دایره $|x| > \frac{2y+1}{y-1} \rightarrow y \neq 1$ $\frac{2y+1}{y-1} \geq 0 \rightarrow \frac{-1}{+1-1} +$ (1) (2)

$R_y = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$

ب) $\frac{|x^2+1}{|x|} = \frac{|x|^2}{|x|} + \frac{1}{|x|} = |x| + \frac{1}{|x|} \rightarrow a + \frac{1}{a}$ $\frac{|x|}{1} \geq y \geq 2 \checkmark$ $R_y = [2, +\infty)$
 $\frac{|x|}{1} < y < -2 \times$

$y = \frac{x^2+2x-2}{x+2} \rightarrow y(x+2) > x^2+2x-2$ $x^2 + (2-y)x - 2 - 2y$ (2) (3)

$\Delta = -(2-y)^2 - 4(-2-2y) \rightarrow (2-y)^2 - 4(-2-2y) \geq 0$

$y^2 - 4y + 4 + 8y + 8 \geq 0$ $y^2 + 4y + 12 \geq 0$ $(y+2)(y+6) \geq 0$ $\frac{-4}{+1} \frac{-2}{-1} +$

$R_y = (-\infty, -4] \cup [-2, +\infty) \checkmark$

$f(x) = \frac{x^2-x+\frac{1}{2}}{x}$ $\rightarrow f(x) = \frac{(x-\frac{1}{2})^2}{(x-\frac{1}{2})^2 + \frac{3}{4}}$ $\min(x-\frac{1}{2})^2 = 0$ (1) (2)

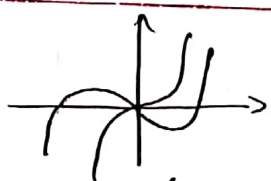
$\frac{x^2-x+\frac{1}{2}}{x^2-x+\frac{1}{2}+\frac{3}{4}}$ $\frac{(x-\frac{1}{2})^2}{(x-\frac{1}{2})^2 + \frac{3}{4}}$ $\max(x-\frac{1}{2})^2 \rightarrow \frac{+\infty}{+\infty + \frac{3}{4}} = 1$ $R_f = [0, 1) \checkmark$
 $x^2-x+\frac{1}{2} \neq 0 \Delta = -1 < 0 \rightarrow + \text{دایره} \rightarrow D_f = \mathbb{R}$

الف) $y = \sqrt{-x^2+2x-1}$ $y' = -x^2+2x-1$ $\Delta = -4 \leq 0 \rightarrow y \leq -1+1-1 = -1$ $\max$ (2) (3)

$R_y' = (-\infty, 3]$ $R_y = \sqrt{(-\infty, 3]}$ $R_y = [0, 2] \checkmark$

ب) $y = \sqrt{2x^2-12x}$ $y' = 2x^2-12x$ $\Delta = 144 \geq 0 \rightarrow y \leq 12-12 = 0$ $\min$ $R_y' = [12, +\infty)$

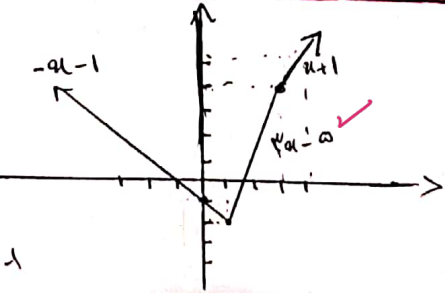
$R_y = \sqrt{[12, +\infty)}$ $R_y = [-2, +\infty) \checkmark$

الف) $y = \log(x^2-x+1)$ $y' = 2x-x+1$ $\rightarrow$  $R_y' = \mathbb{R}$ (2) (3)

$R_y = \log \mathbb{R}$ $R_y = (-\infty, +\infty)$

ب) $y = \log\left(\frac{x^2+1}{x}\right)$ $y' = \frac{x^2}{x} + \frac{1}{x} = x + \frac{1}{x}$ $\frac{x^2}{x} > y' \in [2, +\infty)$ $\bar{Q}$
 $\frac{x^2}{x} < y' \in (-\infty, -2]$ $\bar{Q}$

$D_y = \frac{x^2+1}{x^2} > 0$ $\rightarrow x > 0$ $R_y = \log_{\frac{1}{x^2}} [2, +\infty)$ $R_y = [1, +\infty)$

الف) $y = \left| \frac{2x-2}{x-3} - \frac{1}{x-1} \right|$ $\left\{ \begin{array}{l} x > 3 \rightarrow x+1 \\ 1 < x < 3 \rightarrow x-1 \\ x < 1 \rightarrow -x-1 \end{array} \right.$  $R_y = [-2, +\infty)$ (1,2) (4)

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

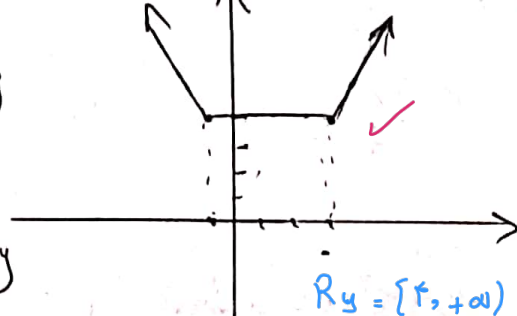
$x-3=0 \rightarrow x=3 \rightarrow y=2$

$$b) y = |x-3| + |x+1|$$

$$x-3=0 \rightarrow x=3 \rightarrow y=4$$

$$x+1=0 \rightarrow x=-1 \rightarrow y=4$$

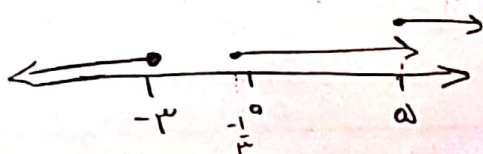
$$\begin{cases} x > 3 & y = x-3 \\ -1 < x < 3 & y = 4 \\ x < -1 & y = -x-1 \end{cases}$$



$$|x-3| - |x+1| \leq 1$$

$$x-3=0 \rightarrow x=3 \rightarrow y=-4$$

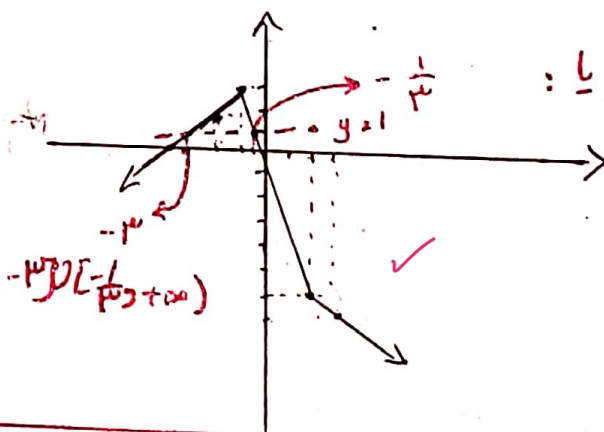
$$x+1=0 \rightarrow x=-1 \rightarrow y=4$$



$$x \in (-\infty, -1] \cup [3, +\infty)$$

$$f(x) = \begin{cases} x-3 & x > 3 \\ -1 & -1 < x < 3 \\ -x-1 & x < -1 \end{cases}$$

$$\begin{array}{|c|c|c|} \hline \text{خود قدر مطلق} & \text{قراردادی و خود قدر مطلق} & \text{خود قدر مطلق} \\ \hline x > 3 & -x+3-x-1 = -2x+2 & x-3-x-1 = -2 \\ \hline -1 < x < 3 & -x+3-x-1 = -2x+2 & -x-1-x-1 = -2x-2 \\ \hline x < -1 & -x+3-x-1 = -2x+2 & -x-1-x-1 = -2x-2 \\ \hline \end{array}$$



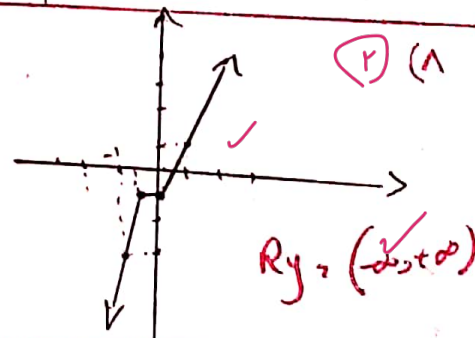
$$y = |x-1| + |x+1|$$

$$x+1=0 \rightarrow x=-1 \rightarrow y=2$$

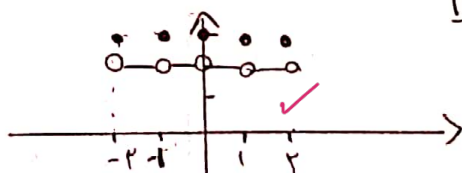
$$x=0 \rightarrow y=1$$

$$x=-1 \rightarrow y=2$$

$$f(x) = \begin{cases} x-1 & x > 0 \\ -1 & -1 < x < 0 \\ x+1 & x < -1 \end{cases}$$



$$a) y = [x] + [x] = [x] + [-x] + 3 \quad \frac{x \in \mathbb{Z}}{x \in \mathbb{Z}} \rightarrow x+3=3 \rightarrow x \in \{+1, +2, 0\}$$



$$R_y = \{x, x\}$$

$$b) y = \cos x - [x]$$

$$-x < -1 \rightarrow \cos x + 1$$

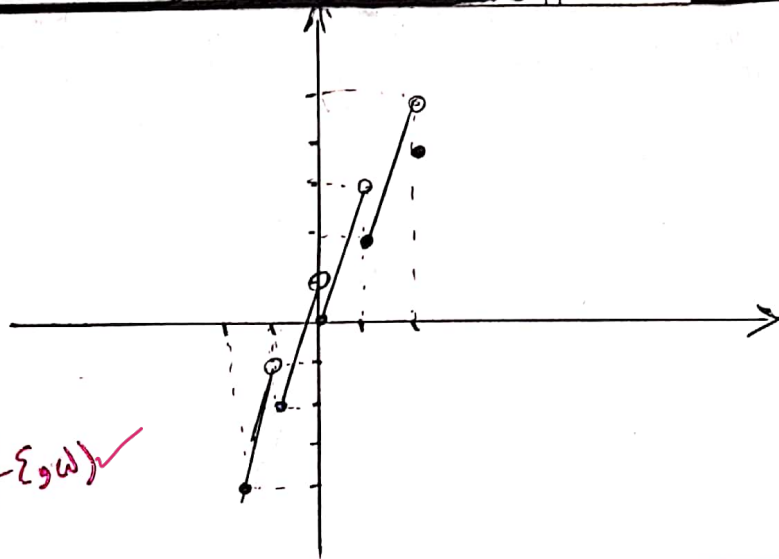
$$-1 < x < 0 \rightarrow \cos x + 1$$

$$0 < x < 1 \rightarrow \cos x$$

$$1 < x < 2 \rightarrow \cos x - 1$$

$$x \geq 2 \rightarrow 1$$

$$R_y = [-\varepsilon, \omega]$$



$$ii) \sin^x x - \sin x + 1$$

$$\sin x = -1 \rightarrow 1 + 1 + 1 = 3$$

$$\sin x = 1 \rightarrow 1 - 1 + 1 = 1$$

$$\sin x = \frac{1}{\sqrt{a}} \rightarrow \frac{1}{\sqrt{a}} - \frac{1}{\sqrt{a}} + 1 = 1$$

$$R_y = \left[\frac{1}{\sqrt{a}}, 3 \right]$$

$$b) \sin^x x + \sin x + 1$$

$$\sin x = -1 \rightarrow 0 + 1 + 1 = 2$$

$$\sin x = 1 \rightarrow 1 + 1 + 1 = 3$$

$$\sin x = \frac{1}{\sqrt{a}} \rightarrow \frac{1}{\sqrt{a}} + \frac{1}{\sqrt{a}} + 1 = 1$$

$$\sin x = 0 \rightarrow 0 + 1 + 1 = 2$$

$$R_y = [2, 3]$$