

نیریا احسنی

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$$(f(-x) - x f(x) = r|x|+1) \times x \rightarrow x f(-x) - x^2 f(x) = r x|x| + x$$

$$f(x) + x f(-x) = \frac{r|x|+1}{r|x|+1}$$

$$\cancel{x f(-x)} - x^2 f(x), \cancel{-x f(-x)} - f(x) = r x|x| + x - r|x| - 1$$

$$(x^2+1)(-f(x)) = r|x|(x-1) + 1(x-1)$$

$$-f(x)(x^2+1) = (r|x|+1)(x-1) \xrightarrow{\times(-1)} f(x)(x^2+1) = -(r|x|+1)(x-1)$$

$$f(x) = \frac{(1-x)(r|x|+1)}{x^2+1}$$

$$f(x) + f(0) = x^2 - rx + 4 \xrightarrow{x=0} f(0) + f(0) = 4 \rightarrow f(0) = 2$$

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$$f(x) = x^2 - rx + 2 \rightarrow f(x^2) = x^4 - rx^2 + 2$$

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

$$\Delta \geq 0 \rightarrow (1-y)^2 - 4(r+y) \geq 0 \rightarrow y^2 - 4y + 1 - 4r - 4y \geq 0$$

$$y^2 - 4y - 4r \geq 0 \quad \frac{-1}{+1} \quad \frac{v}{-1+}$$

$$R = (-\infty, -1] \cup [v, +\infty)$$

$$\omega) y = x^2 - 2x + 1 \quad \cup \rightarrow -\frac{b}{2a} = \frac{\omega}{2} \quad y_{\min} = x \times \frac{y_0}{1} - a \left(\frac{a}{\epsilon} \right) + 1$$

$$Ry = \left[-\frac{1}{\lambda}, +\infty \right)$$

$$\frac{y_0}{\lambda} - \frac{\delta_0}{\lambda} + \frac{\lambda}{\lambda} = -\frac{1}{\lambda}$$

$$\rightarrow \sqrt{-2x^2 + 4x - 1}$$

$$-2x^2 + 4x - 1 \rightarrow -\frac{b}{2a} = x \quad y_{\max} = -1 + (1 - 1) = -1 \rightarrow (-\infty, -1]$$

$$\sqrt{\quad} \rightarrow [0, 1]$$

$$2) y = \sqrt{2x^2 - 3x + 1} \quad \rightarrow \sqrt{\quad} \rightarrow [0, +\infty)$$

$$3) \log(x^2 - 4x + 5)$$

$$\log(-\infty, +\infty) \Rightarrow \log(0, +\infty)$$

$$R = \mathbb{R}$$

$$\log(x) = -\infty \quad \log(x) = +\infty$$

$$x \rightarrow 0 \quad x \rightarrow +\infty$$

$$\omega) y = \frac{x+1}{x-1} \rightarrow x = -\frac{y-1}{y-1} = \frac{y+1}{y-1}$$

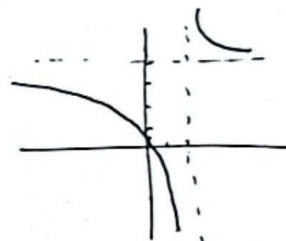
$$R = (-\infty, \frac{1}{2}) \cup (\frac{1}{2}, +\infty)$$

$$xy - 1 \neq 0 \rightarrow y \neq \frac{1}{x}$$

$$1) y = \sqrt{\frac{x+1}{x-1}}$$

$$\frac{x+1}{x-1}$$

$$R = \mathbb{R} - \{1\}$$



$$\sqrt{\quad} \rightarrow (-\infty, 1) \cup (1, +\infty)$$

$$2) y = \frac{x^2 + x}{\sqrt{x^2 + x}} = \frac{x^2 + x}{\sqrt{x^2 + x}} + \frac{1}{\sqrt{x^2 + x}} = \sqrt{x^2 + x} + \frac{1}{\sqrt{x^2 + x}} \rightarrow \text{نشت} \geq 1$$

$$R = [1, +\infty)$$

$$3) y = x^2 + \frac{1}{x^2 + 1} = \frac{x^4 + x^2 + 1}{x^2 + 1} \xrightarrow{x^2 = t} \frac{t^2 + t + 1}{t + 1}$$

$$\begin{cases} \min = 0 \rightarrow \frac{a + \epsilon(0) + 1}{a + \epsilon} = \frac{1}{\epsilon} \\ \max: +\infty \rightarrow +\infty \end{cases}$$

$$R = \left[\frac{1}{\epsilon}, +\infty \right)$$

$$y = \frac{3x^2 + 5}{2x - 1}$$

$$x = 2^x \begin{cases} \rightarrow \min = 0 \\ \rightarrow \max = +\infty \end{cases}$$

$$\min = \frac{3(0) + 5}{0 - 1} = -5$$

$$\max = \frac{3(+\infty)}{+\infty} = 3$$

خرج می تواند به بی نهایت خارج بازه

$$R = (-\infty, -5] \cup [3, +\infty)$$

$$y = \frac{3 \sin x + 5}{\sin x - 3}$$

$$x = \sin x \begin{cases} \rightarrow \min = -1 \\ \rightarrow \max = 1 \end{cases}$$

$$\min = \frac{3(-1) + 5}{-1 - 3} = -\frac{1}{4}$$

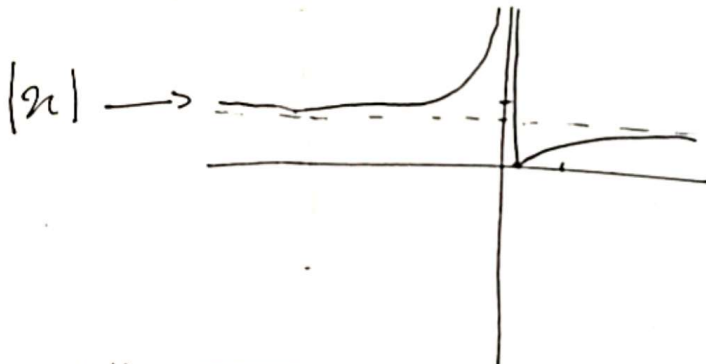
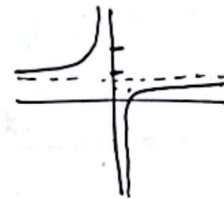
$$\max = \frac{3(1) + 5}{1 - 3} = -3$$

خرج نمی تواند منفی شود به داخل بازه

$$R = [-3, -\frac{1}{4}]$$

$$الف) y = \left| \frac{3x - 1}{x} \right|$$

$$\frac{3x - 1}{x} \rightarrow$$



$$R = [0, +\infty)$$

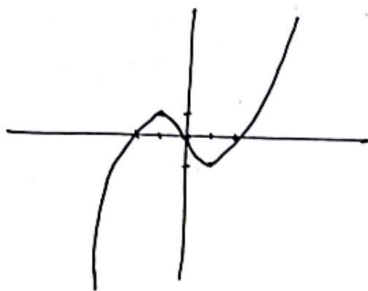
$$ب) y = \sqrt{\frac{9x - 11}{-11 + 5x}}$$

$$\sqrt{\frac{9}{5}} = \frac{3}{\sqrt{5}}$$

$$R = \left\{ \frac{3}{\sqrt{5}} \right\}$$

$$\frac{9x - 11}{5x - 11} = \frac{9}{5}$$

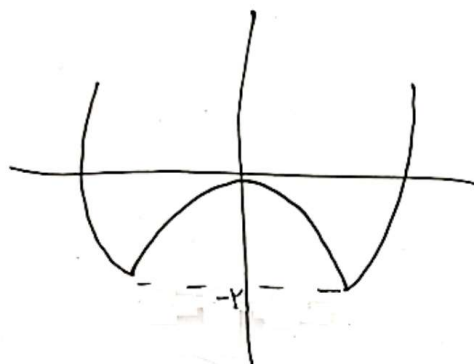
$$y = x|x| - x^2$$



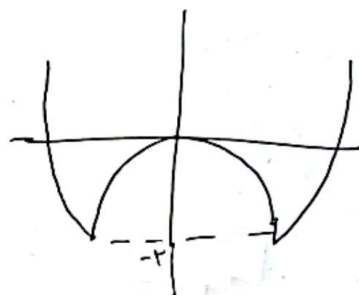
$$y = \begin{cases} x^2 - x & x \geq 0 \\ -x^2 - x & x < 0 \end{cases}$$

$$R = \mathbb{R}$$

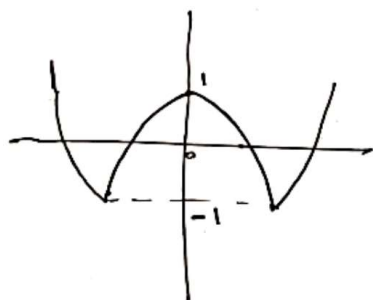
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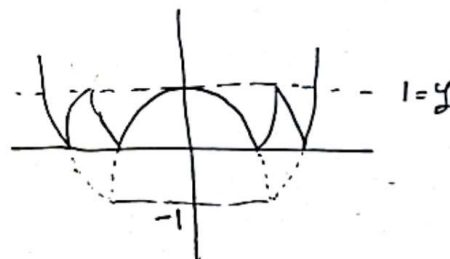
$\xrightarrow{|x|}$



$\xrightarrow{+1}$



$\rightarrow y = |x| \rightarrow$



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$$y = |f(|x|) + 1|$$