

1A

نیریا احسنی

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

(1)

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

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

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

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

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

(2) -2

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

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

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

(3)

$$y^2 - 6y + 1 \geq 0 \quad \frac{-1}{+1} \quad \frac{+1}{-1}$$

$$R = (-\infty, -1] \cup [5, +\infty) \checkmark$$

$$\omega) y = x^2 - 2x + 1$$

$$\cup \rightarrow -\frac{b}{2a} = \frac{\omega}{2}$$

$$y_{\min} = 1 \times \frac{1}{4} - 2 \left(\frac{1}{2} \right) + 1 = \frac{1}{4} - 1 + 1 = \frac{1}{4}$$

$$R_y = \left[-\frac{1}{4}, +\infty \right)$$

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

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

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

$$3) \log(x^3 - 4x^2 + 5x + 1)$$

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

$$R = \mathbb{R}$$

$$\log(x) = -\infty \quad x \rightarrow 0$$

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

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

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

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

$$4) y = \sqrt{\frac{x+1}{x-1}}$$

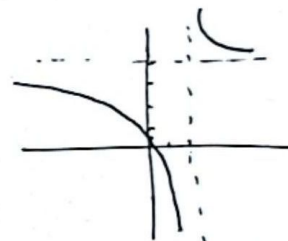
$$R = [0, +\infty)$$

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

$$\rightarrow (-\infty, 1) \cup (1, +\infty)$$

$$[0, +\infty) - \{1\}$$

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



$$5) y = \frac{x^2 + x}{\sqrt{x^2 + x}} = \frac{x^2 + x}{\sqrt{x^2 + x}} + \frac{1}{\sqrt{x^2 + x}} = \sqrt{x^2 + x} + \frac{1}{\sqrt{x^2 + x}} \geq 2$$

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

! nicht negativ !
! gleiches Mal !

$$6) y = x^2 + \frac{1}{x^2 + 1} = \frac{x^4 + x^2 + 1}{x^2 + 1} \xrightarrow{x^2 = t} \frac{t^2 + t + 1}{t + 1} \begin{cases} \min = 0 \rightarrow \frac{0 + 1 + 1}{0 + 1} = 2 \\ \max = +\infty \rightarrow +\infty \end{cases}$$

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

$$7) y = \frac{x^2 + x + 1}{\sqrt{x^2 + x}} = \sqrt{x^2 + x} + \frac{1}{\sqrt{x^2 + x}}$$

$$a > 0 \rightarrow \min a = \sqrt{x} \rightarrow y_{\min} = \frac{1 + \sqrt{x}}{\sqrt{x}} \rightarrow R_y = \left[\frac{1 + \sqrt{x}}{\sqrt{x}}, +\infty \right)$$

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$$y = \frac{3x^2 + 4}{x^2 - 1}$$

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

روشن اصل

$$\min = \frac{3(0) + 4}{0 - 1} = -4$$

$$\max = \frac{3(+\infty) + 4}{+\infty} = 3$$

مقدارهای بی نهایت پیدا تو بازه نیست!

خارج می تواند شود به خارج بازه

$$R = (-\infty, -4] \cup [3, +\infty)$$

$$y = \frac{2 \sin x + 4}{\sin x - 3}$$

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

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$$\min = \frac{2(-1) + 4}{-1 - 3} = -\frac{1}{2}$$

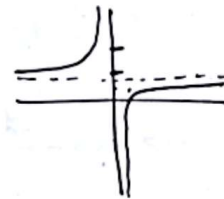
$$\max = \frac{2(1) + 4}{1 - 3} = -3$$

خارج نمی تواند مندر شود به داخل بازه

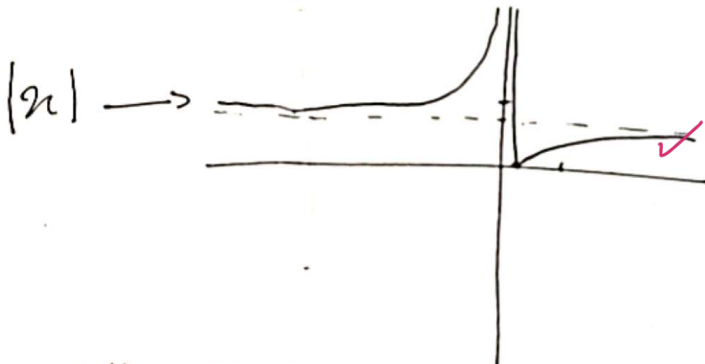
$$R = [-3, -\frac{1}{2}]$$

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

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



۲ - ۸



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

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

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

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

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

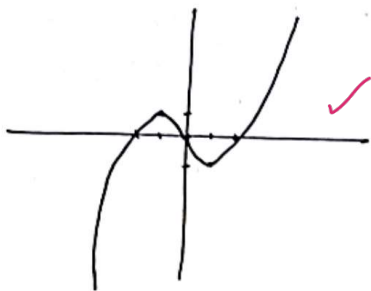
$$روشن اصل: y \cdot x^2 - y = 3x^2 + 4 \rightarrow (y-3)x^2 = y+4$$

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$$x^2 = \frac{y+4}{y-3} \geq 0 \rightarrow \frac{-4}{+4} \frac{3}{-1} \Rightarrow R_y = (-\infty, -4] \cup (3, +\infty)$$

$$نکته: x = x^2 \rightarrow \begin{cases} x^2 = 0 \rightarrow y = -4 \\ x^2 \sim \infty \rightarrow y = 3 \end{cases} \xrightarrow{\text{مخرج میونه منفه}} R_y = (-\infty, -4] \cup (3, +\infty)$$

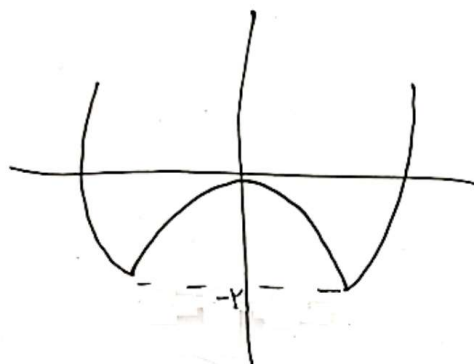
$$y = x|x| - x^2$$



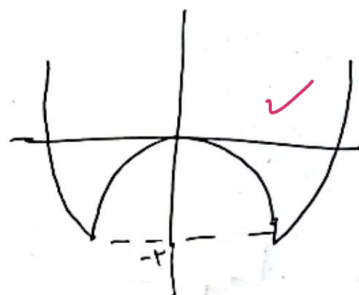
$$y = \begin{cases} x^2 - x & x \geq 0 \\ -x^2 - x & x < 0 \end{cases}$$

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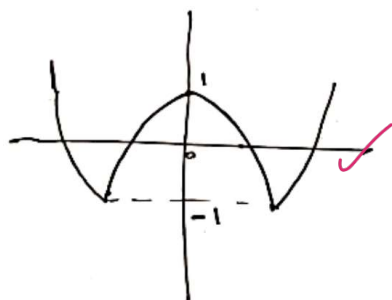
$$R = \mathbb{R}$$



$\frac{|x|}{x} \rightarrow$



$+1 \rightarrow$



$$\rightarrow y = |x| \rightarrow$$

