

$$\begin{aligned} (f(-x) - x f(x) = 2|x| + 1) \times x &\rightarrow \begin{cases} x f(-x) - x^2 f(x) = (2|x| + 1)x \\ + f(x) - x f(-x) = -2|-x| + 1 \end{cases} \\ (f(x) + x f(-x) = 2|-x| + 1) \times -1 &\rightarrow \begin{cases} x f(-x) - x^2 f(x) = (2|x| + 1)x \\ + f(x) - x f(-x) = -2|-x| + 1 \end{cases} \\ \text{زیادتار!} & \\ f_{\text{even}} = \frac{(1-x)(2|x|+1)}{1+x^2} &\Rightarrow f(x) = \frac{2|x|x| + 2|-x| + x - 1}{-x^2 - 1} \quad (|x| = |-x|) \end{aligned}$$

$$\begin{aligned} f(x) + f(0) &= x^2 - cx + 4 \\ x=0 &\Rightarrow 2f(0) = 4 \Rightarrow f(0) = 2 \\ f(x) + 2 &= x^2 - cx + 4 \Rightarrow f(x) = x^2 - cx + 2 \Rightarrow f(x^2) = x^4 - cx^2 + 2 \end{aligned}$$

$$\begin{aligned} y &= \frac{x^2 + x + 2}{x-1} \Rightarrow yx - y = x^2 + x + 2 \Rightarrow x^2 + x - yx + 2 + y = 0 \\ x^2 + (1-y)x + 2+y &= 0 \quad \text{I} \quad \text{II} \quad \text{III} \quad \text{IV} \\ \Delta &\geq 0 \Rightarrow (1-y)^2 - 4(1)(2+y) \geq 0 \Rightarrow 1 + y^2 - 2y - 8 - 4y \geq 0 \Rightarrow y^2 - 6y - 7 \geq 0 \\ &\Rightarrow (y-7)(y+1) \geq 0 \Rightarrow y \in (-\infty, -1] \cup [7, +\infty) \end{aligned}$$

$$\begin{aligned} 1) \quad x^2 - 5x + 1 &= 0 \quad \begin{cases} \rightarrow y = \sqrt{-x^2 + 4x - 5} \\ \text{ex} \begin{vmatrix} 5 \\ -1 \\ 1 \end{vmatrix} \quad (-\infty, 4] \\ \sqrt{\quad} \rightarrow [0, 2] \end{cases} \\ 2) \quad y = \sqrt{x^2 - 2x^2 + 4x + 1} &\quad R = \mathbb{R} \\ 3) \quad y = \log(x^2 - 4x^2 + 4x + 2) &\quad \begin{cases} \log(\infty + \infty) \\ R = (-\infty, +\infty) \end{cases} \end{aligned}$$

$$\begin{aligned} 1) \quad y = \frac{x^2 + 1}{x^2 - 2} &\quad R = \left\{ \frac{3}{2} \right\} \\ 2) \quad y = \sqrt{\frac{4x+1}{x-2}} &\quad \begin{cases} R = \{2\} \\ [0, +\infty) - \{2\} \end{cases} \\ 3) \quad y = \frac{x^2 + 4}{\sqrt{x^2 + 3}} &\quad \begin{cases} (\sqrt{x^2 + 3})(\sqrt{x^2 + 3}) + 1 \\ \sqrt{x^2 + 3} + \frac{1}{\sqrt{x^2 + 3}} \end{cases} \\ 4) \quad y = x^2 + \frac{1}{x^2 + 4} &\quad \begin{cases} 0 + \frac{1}{0+4} = \frac{1}{4} \\ \left[\frac{1}{4}, +\infty \right) \end{cases} \end{aligned}$$

$$2) \quad y = \frac{x^2 + 3 + 1}{\sqrt{x^2 + 3}} = \sqrt{x^2 + 3} + \frac{1}{\sqrt{x^2 + 3}}$$

$$a \rightarrow \min a = \sqrt{3} \rightarrow y_{\min} = \frac{4\sqrt{3}}{3} \rightarrow R_y = \left[\frac{4\sqrt{3}}{3}, +\infty \right)$$

$$\sqrt{3} + \frac{1}{\sqrt{3}} !!$$

$y = \frac{3x^2 + 4}{x^2 - 1}$ $\frac{1}{x^2 - 1}$ $x^2 \rightarrow -f$ $x^2 \rightarrow +\infty : 3$ $(-\infty, -1) \cup (1, +\infty)$ $(-1, 1)$ مخرج و منبسط به ۱	$y = \frac{3x^2 + 4}{x^2 - 1} \rightarrow$ درجه ۲ $yx^2 - y = 3x^2 + 4 \Rightarrow 3x^2 - yx^2 = -y - 4$ $x^2(3 - y) = -y - 4 \Rightarrow x = \sqrt{\frac{y+4}{y-3}}$ $R = (-\infty, -1) \cup (1, +\infty)$	۶
$\frac{2 \sin x + f}{\sin x - 2}$ $\sin x = 1 : \frac{-2}{-2} = 1$ $\sin x = -1 : \frac{-4}{-4} = 1$ $-1 \leq \sin x \leq 1$ مخرج و منبسط به ۱	به صورت سوال درفت کن! $\left[\frac{3}{2} \right]$ مخرج و منبسط به ۱	۷
$y = \left \frac{3x-1}{4x} \right $ الف $\frac{3}{4}$ $\frac{1}{4}$ $ f(x) $ $R_f = [0, +\infty)$	$y = \sqrt{\frac{9x-18}{4x-8}}$ $\frac{9x-18}{4x-8} \rightarrow \frac{9}{4} \frac{(4x-8)}{4x-8} = \frac{9}{4}$ $\sqrt{\frac{9}{4}} = \frac{3}{2}$	۸
$y = x(x -2)$ $R = R$ 		۹
$y = f(x) + 1 $ $f(x)$ $f(x)$ $f(x) + 1$ $ f(x) + 1 $		۱۰

$$\square = \sin n \rightarrow \begin{cases} \sin n = -1 \rightarrow y = -\frac{1}{r} \\ \sin n = 1 \rightarrow y = -3 \end{cases} \xrightarrow[\text{منه غايوة}]{\text{منه}} Ry = [-3, -\frac{1}{r}]$$

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