

$$\begin{aligned} 1. & (f(-x) - x f(x) = 2|x| + 1) \times x \Rightarrow \begin{cases} x f(-x) - x^2 f(x) = 2|x| + x \\ f(x) + x f(-x) = 2|x| + 1 \end{cases} \\ 2. & f(x) + x f(-x) = 2|x| + 1 \end{aligned}$$

$$3. x \geq 0 \Rightarrow (x^2 + 1) f(x) = -2x^2 + x + 1, \quad x < 0 \Rightarrow (x^2 + 1) f(x) = 2x^2 - 3x + 1$$

$$4. \Rightarrow f(x) = \frac{-2x^2 + x + 1}{x^2 + 1} \quad \Rightarrow f(x) = \frac{2x^2 - 3x + 1}{x^2 + 1}$$

$$6. f(x) + f(0) = 2 - 3x + 4 \quad x=0 \Rightarrow 2f(0) = 4 \Rightarrow f(0) = 2$$

$$7. \Rightarrow f(x) = 2 - 3x + 4 \quad x^2 \Rightarrow f(x^2) = x^4 - 3x^2 + 4$$

$$9. y = \frac{x^2 + x + 2}{x - 1} \Rightarrow x^2 + x + 2 = xy - y \Rightarrow x^2 + (1 - y)x + y + 2 = 0$$

$$10. \Rightarrow x = \frac{y - 1 \pm \sqrt{(1 - y)^2 - 4(y + 2)}}{2} \Rightarrow (1 - y)^2 - 4(y + 2) \geq 0$$

$$11. \Rightarrow y^2 - 2y + 1 - 4y - 8 \geq 0 \Rightarrow y^2 - 6y - 7 \geq 0 \Rightarrow (y - 7)(y + 1) \geq 0$$

$$14. (a) y = 2x^2 - 2x + 1 \Rightarrow \min \left| \frac{-b}{2a} \right| = \frac{1}{2} \Rightarrow R = \left[\frac{1}{2}, +\infty \right)$$

$$16. (b) y = \sqrt{-x^2 + 4x - 5} \Rightarrow \max \left| \frac{-b}{2a} \right| = 2 \Rightarrow R = \sqrt{(-\infty, 4]} = [0, 2]$$

$$18. (c) y = \sqrt{x^2 - 3x^2 + 4x + 1} \Rightarrow \text{برهسته} = R \Rightarrow R = \sqrt{(-\infty, +\infty)} = [0, +\infty)$$

$$20. (d) \log(x^2 - 4x^2 + 5x + 4) \Rightarrow \text{برهسته} = R \Rightarrow \log(0, +\infty) \Rightarrow R = R$$

$$22. (a) y = \frac{3x + 1}{x^2 - 4} \Rightarrow \text{برهسته} = R = R - \left\{ \frac{a}{c} \right\} \Rightarrow R, R - \left\{ \frac{3}{4} \right\}$$

$$24. (b) y = \sqrt{\frac{x + 1}{x - 2}} \Rightarrow \text{برهسته} = R = R - \left\{ \frac{a}{c} \right\} = R - \{1\} \Rightarrow R = \sqrt{R - \{1\}} = [0, +\infty) - \{1\}$$

$$ج) y, \frac{x^2 + 4}{\sqrt{x^2 + 3}} = \frac{x^2 + 3 + 1}{\sqrt{x^2 + 3}} = \sqrt{x^2 + 3} + \frac{1}{\sqrt{x^2 + 3}} \rightarrow \text{لغزین معیار} = \sqrt{3} + \frac{1}{\sqrt{3}} = \frac{4}{\sqrt{3}} = \frac{4\sqrt{3}}{3}$$

($\sqrt{x^2 + 3} > 0$)

$$\Rightarrow R = \left[\frac{4\sqrt{3}}{3}, +\infty \right)$$

$$د) x^2 + \frac{1}{x^2 + 4} + 4 - 4 \rightarrow \text{لغزین معیار} = 4 + \frac{1}{4} - 4 = \frac{1}{4} \Rightarrow R = \left[\frac{1}{4}, +\infty \right)$$

($x^2 + 4 > 0$)

$$۱. y, \frac{3x^2 + 4}{x^2 - 1} \Rightarrow 3x^2 + 4, yx^2 - y \Rightarrow x^2(3 - y) = -y - 4 \Rightarrow x^2 = \frac{y + 4}{y - 3} \Rightarrow x = \pm \sqrt{\frac{y + 4}{y - 3}}$$

$$\Rightarrow \frac{-4}{4 - 3} \Rightarrow R = (-\infty, -4] \cup (3, +\infty)$$

$$۲. y, \frac{3x^2 + 4}{x^2 - 1} \rightarrow x^2 = 0 \Rightarrow y = -4 \Rightarrow \text{مخرج می تواند صفر شود و ۳ به ازای } x^2 = +\infty \text{ بدست}$$

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

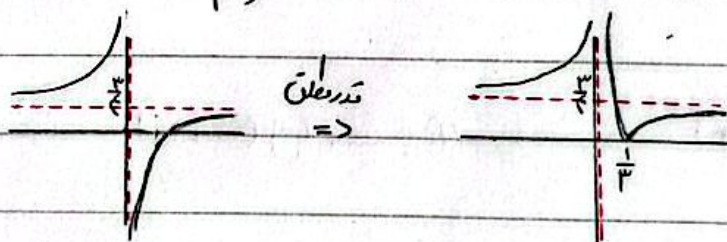
آینه پس:

$$f(x) = \frac{5 \sin x + 4}{\sin x - 3} \rightarrow \sin x = -1 \Rightarrow y = \frac{-2 + 4}{-1 - 3} = \frac{2}{-4} = -\frac{1}{2}$$

$$\rightarrow \sin x = 1 \Rightarrow y = \frac{2 + 4}{1 - 3} = \frac{6}{-2} = -3$$

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

$$\leftarrow \text{مخرج نمی تواند صفر شود} \quad (\sin x - 3 < 0)$$



$$الف) y = \left| \frac{3x - 1}{4x} \right|$$

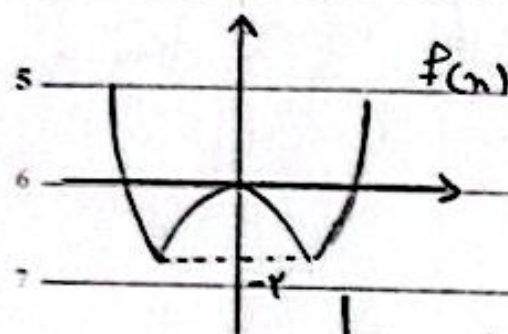
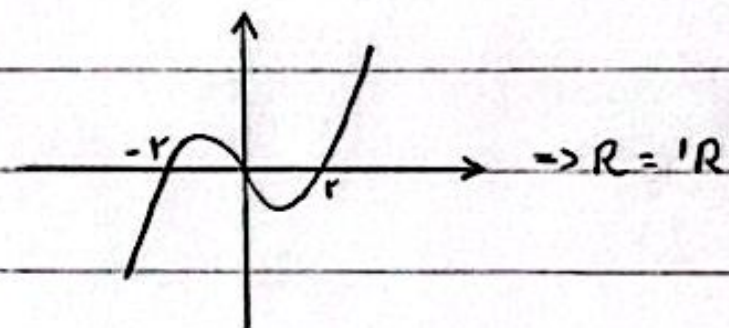
$$\text{میان قاعده} = 0$$

$$\text{قاعده انتصاف} = \frac{3}{4}$$

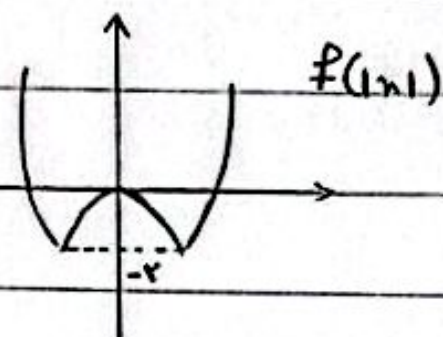
$$\Rightarrow R = [0, +\infty)$$

$$ب) y, \sqrt{\frac{9x - 18}{-8 + 4x}} = \sqrt{\frac{9(x - 2)}{4(x - 2)}} = \sqrt{\frac{9}{4}} = \frac{3}{2} \Rightarrow R = \left\{ \frac{3}{2} \right\}$$

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



$\Rightarrow$



$\Rightarrow$

