

عملیات

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

سوال ۲

$$\rightarrow f(x) + xf(x) = 2|x| + 1$$

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

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

$$\rightarrow f(-x) = 2|x| + 1 + xf(x)$$

$$f(x) + x(2|x| + 1 + xf(x)) = 2|x| + 1$$

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

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

$$f(x) + f(0) = x^2 - 2x + 4$$

سوال ۲

$$\rightarrow x=0 \rightarrow 4f(0) = 4 \rightarrow f(0) = 1$$

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

$$xy - y = x^2 + x + 1 \rightarrow x^2 + (1-y)x + (1+y) = 0$$

سوال ۲

$$\rightarrow x = \frac{1 \pm \sqrt{(1-y)^2 - 4(1+y)(1)}}{2} = y^2 - 4y - 1$$

$$\rightarrow y^2 - 4y - 1 \geq 0 \rightarrow (y-5)(y+1) \geq 0 \rightarrow \frac{-1}{+5} \leq y \leq +\infty$$

$$\rightarrow Rf = (-\infty, -1] \cup [5, +\infty)$$

الف) $y = 2x^2 - 2x + 1 \rightarrow -\frac{b}{2a} = \frac{-(-2)}{4} = \frac{1}{2}$ ← سؤال ٤٨
 $\rightarrow 2\left(\frac{1}{2}\right) - \frac{2}{4} + 1 = -\frac{1}{2} \rightarrow Rf = \left[-\frac{1}{2}, +\infty\right)$

ب) $y = \sqrt{-x^2 + 4x - 2} - \frac{b}{2a} = \frac{4}{2} = 2 \rightarrow -9 + 18 - 2 = 7$
 $\rightarrow \sqrt{(-2, 2)} \rightarrow [0, 2]$ وقت!

ج) $y = \sqrt{x^2 - 3x^2 + 5x + 1} \rightarrow Rf = [0, +\infty)$

د) $\log x^2 - 4x^2 + 5x + 2$
 $\rightarrow Rf = (-\infty, +\infty)$

$y = \frac{x+1}{x^2-4} \rightarrow R - \left\{\frac{a}{c}\right\} = R - \left\{\frac{1}{-4}\right\}$ ← سؤال ٢

$y = \sqrt{\frac{5x+1}{x-2}} \rightarrow R - \{2\} \rightarrow [0, +\infty) \cup \{2\}$ (٢)

$y = \frac{x^2+5}{\sqrt{x^2+3}} = \frac{x^2+3+2}{\sqrt{x^2+3}} \xrightarrow{\text{تقسيم}} \sqrt{x^2+3} + \frac{2}{\sqrt{x^2+3}}$

$\rightarrow x=0 \rightarrow \sqrt{3} + \frac{2}{\sqrt{3}} = \frac{5}{\sqrt{3}} \rightarrow Rf = \left[\frac{5}{\sqrt{3}}, +\infty\right)$

$y = x^2 + \frac{1}{x^2+5} + 5 - 5 \rightarrow \left[x^2 + 5 + \frac{1}{x^2+5}\right] - 5$

$\rightarrow Rf = \left[\frac{1}{5}, +\infty\right)$

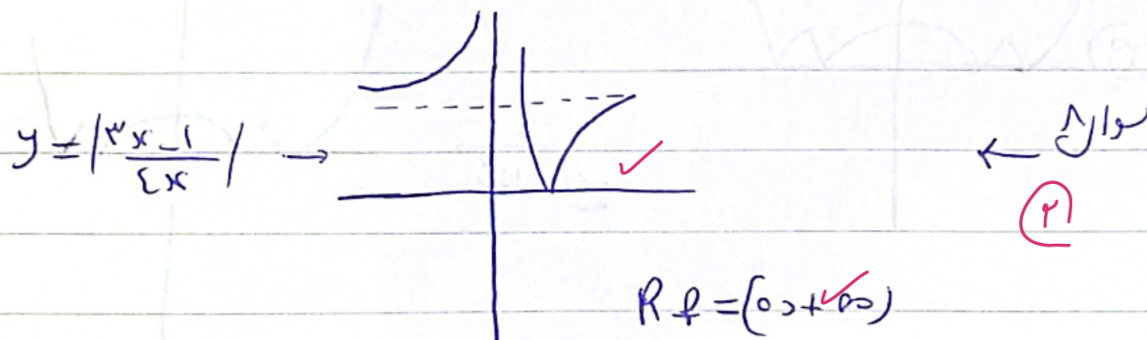
$$y = \frac{3x^2 + \xi}{x^2 - 1} \rightarrow yx^2 - y = 3x^2 + \xi \quad \text{سوال ۲۱} \leftarrow$$

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

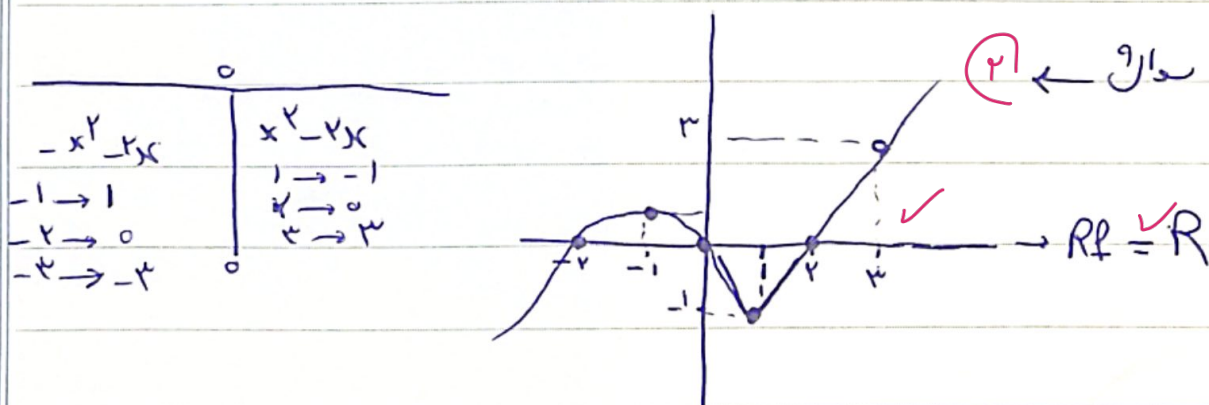
$$\rightarrow \frac{\xi + y}{y - 3} \rightarrow \frac{-\xi}{+1 - 1} \rightarrow (-\infty, -\xi] \quad (\xi \rightarrow +\infty)$$

$$\sqrt{x} \rightarrow \square = x^2 \rightarrow \begin{cases} x^2 = 0 \rightarrow y = -\xi \\ x^2 = \infty \rightarrow y = 3 \end{cases} \rightarrow Rf = (-\infty, -\xi] \cup (3, +\infty)$$

$$y = \frac{2 \sin x + \xi}{\sin x - 3} \rightarrow \begin{cases} \sin x = 1 \rightarrow -\frac{3}{2} \\ \sin x = -1 \rightarrow -\frac{1}{2} \end{cases} \rightarrow Rf = [-\frac{3}{2}, -\frac{1}{2}] \quad \text{سوال ۲۱} \leftarrow$$



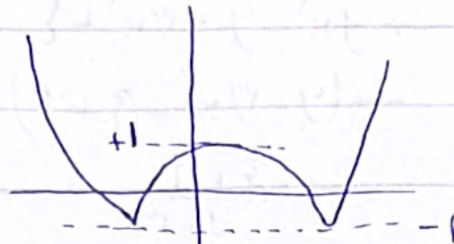
$$y = \sqrt{\frac{4x-1}{2x-1}} = \sqrt{\frac{4(x-1/4)}{2(x-1/2)}} = \sqrt{\frac{2}{x-1/2}} = \frac{2}{x-1/2} \rightarrow Rf = \left\{ \frac{x}{2} \right\}$$



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

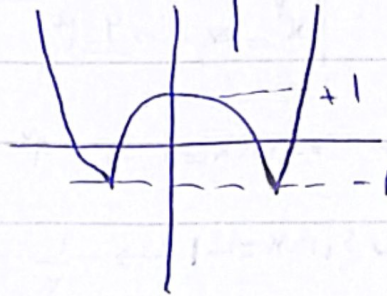
سوال ۱ ←

① $f(x) + 1$



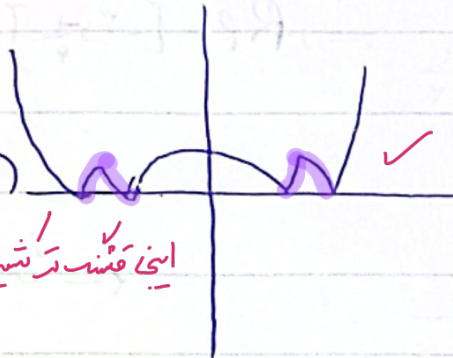
②

② $\rightarrow f(|x|) + 1$



③

این قوس در شیب مان



شکل ۱



Scbo