

$$f(-x) - x f(x) = 2|x| + 1 \quad \begin{matrix} A = f(x) \\ B = f(-x) \end{matrix} \quad \begin{cases} B - xA = 2|x| + 1 \rightarrow B = xA + 2|x| + 1 \\ A + xB = 2|x| + 1 \end{cases} \quad \text{حالت اول}$$

$$A + x(2|x| + 1 + xA) = 2|x| + 1$$

$$A + x(2|x| + 1) + x^2 A$$

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

$$f(x) + f(0) = x^2 - 3x + 4 \Rightarrow f(x) + 3 = x^2 - 3x + 4 \rightarrow f(x) = x^2 - 3x + 1$$

$$\xrightarrow{x=0} f(0) = 1 \rightarrow f(0) = 3$$

$$\rightarrow f(x^2) = (x^2)^2 - 3x^2 + 1 = x^4 - 3x^2 + 1$$

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

$$\Delta \geq 0 \rightarrow (1 - y)^2 - 4(y + 2) \geq 0 \rightarrow 1 - 2y + y^2 - 4y - 8 \geq 0 \rightarrow y^2 - 6y - 7 \geq 0$$

$$(y - 7)(y + 1) \geq 0 \Rightarrow \begin{cases} y \geq 7 \\ y \leq -1 \end{cases} \Rightarrow R_f = (-\infty, -1] \cup [7, +\infty)$$

$$\text{الف) } y = 2x^2 - 3x + 1$$

$$-\frac{b}{2a} = \frac{3}{4} \xrightarrow{\text{حالت اول}} y_s = -\frac{11}{4}$$

$$R_f = [-\frac{11}{4}, +\infty)$$

$$\text{ج) } y = \sqrt{x^2 - 3x^2 + 4x + 4} \Rightarrow R_f = [0, +\infty)$$

$$\text{د) } y = \log(x^2 - 4x^2 + 11x + 4)$$

$$\rightarrow R_f = (-\infty, +\infty)$$

$$\text{ب) } y = \sqrt{-x^2 + 4x - 4} \rightarrow R_f = [0, 2]$$

$$-\frac{b}{2a} = 2 \rightarrow y_s = 4$$

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

$$\rightarrow R_f = \mathbb{R} - \left\{\frac{3}{2}\right\}$$

$$y = \sqrt{x^2 + 3} + \frac{1}{\sqrt{2x^2 + 3}} \xrightarrow{x=0} \sqrt{3} + \frac{1}{\sqrt{3}} = \frac{4}{\sqrt{3}}$$

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

$$y = x^2 + 4 + \frac{1}{x^2 + 4} - 4 \xrightarrow{x=0} 4 + \frac{1}{4} - 4 = \frac{1}{4}$$

$$\rightarrow R_f = \left[\frac{1}{4}, +\infty\right)$$

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

$$\rightarrow \mathbb{R} - \{1\} \Rightarrow R_f = [0, +\infty) - \{1\}$$

$$y = \frac{3x^2 + 4}{x^2 - 1} \quad \begin{cases} x=0 \rightarrow y = -4 \\ x=+\infty \rightarrow y = 3 \end{cases} \xrightarrow{\text{ریشه منبری شود}} R_f = (-\infty, -4] \cup (3, +\infty)$$

$$y(x^2 - 1) = 3x^2 + 4$$

$$(y-3)x^2 = y+4$$

$$x^2 = \frac{y+4}{y-3} \quad \begin{matrix} x & | & -\infty & 3 & +\infty \\ y & | & +4 & -3 & +\infty \end{matrix} \Rightarrow R_f = (-\infty, -4] \cup (3, +\infty)$$

$$y = \frac{y \sin x + 4}{\sin x - 3} \quad \begin{cases} \sin x = 1 \rightarrow y = \frac{4}{-4} = -1 \\ \sin x = -1 \rightarrow y = \frac{4}{-4} = -1 \end{cases}$$

$$\xrightarrow{\text{منبری شود}} R_f = [-1, -1]$$

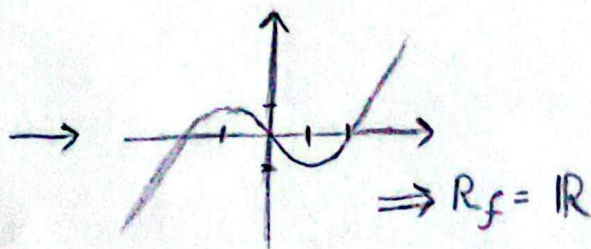
$$\text{الف) } y = \left| \frac{3x-1}{4x} \right| \quad x \geq 0 \quad \frac{3x-1}{4x} = y \rightarrow x = \frac{1}{3-4y} \quad \begin{matrix} y=0 \rightarrow x=\frac{1}{3} \\ y=\frac{3}{4} \rightarrow x=0 \end{matrix} \quad R_f = [0, +\infty)$$

$$\text{ب) } y = \sqrt{\frac{9x-11}{-1+4x}} = \sqrt{\frac{9(x-4)}{4(x-4)}} = \sqrt{\frac{9}{4}} = \frac{3}{2} \Rightarrow R_f = \left\{ \frac{3}{2} \right\}$$

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

$$x \geq 0 \rightarrow y = x^2 - 2x$$

$$x < 0 \rightarrow y = -x^2 - 2x$$



$$y = f(x) \rightarrow$$

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

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

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

