

$$\begin{aligned} x \cdot f(-x) - x f(x) &= 2|x| + 1 \\ -x \cdot f(x) - x f(-x) &= 2|x| + 1 \end{aligned} \quad \left. \begin{array}{l} \text{معادله بالا را در } x \text{ ضرب} \\ \text{در معادله بالا جای } x \text{ کنیم} \end{array} \right\} \rightarrow x f(-x) - x f(x) = x(2|x| + 1)$$

$$\xrightarrow[\text{در معادله}]{\text{تفاضل}} (x^2 + 1) f(x) = (1 - x)(2|x| + 1) \Rightarrow f(x) = \frac{(1 - x)(2|x| + 1)}{x^2 + 1}$$

جواب

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

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

$$f(x^2) = x^4 - 2x^2 + 2 \quad \text{جواب}$$

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

$$x = \frac{-(1-y) \pm \sqrt{(1-y)^2 - 4(2+y)}}{2} \rightarrow \begin{aligned} &y^2 - 4y - 7 \geq 0 \\ &(y-7)(y+1) \geq 0 \end{aligned}$$

$$R_f = (-\infty, -1] \cup [7, +\infty)$$

جواب

$$y = \log(x^2 - 4x^2 + 7x + 8)$$

چون چند جمله‌ای درجه فرد است و همچنین تابعی نبوده است و هر مقدار حقیقی را دارد پس:

$$R_f = \mathbb{R} \quad \text{جواب}$$

$$y = \sqrt{x^2 - 4x^2 + 8x + 1}$$

$$R_f = \mathbb{R} \quad \text{جواب}$$

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

جواب

$$y = \sqrt{-x^2 + 4x - 5}$$

$$x_5 = \frac{-4}{-2} = 2$$

$$y_5 = -4 + 16 - 5 = 7$$

$$R_f = [0, 7]$$

جواب

$$y = 2x^2 - 8x + 1 \quad (\text{الف})$$

$$x_5 = \frac{8}{2} = 4$$

$$y_5 = -16 + 32 + 1 = 17$$

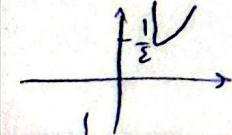
$$R_f = [-17, +\infty)$$

جواب

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

$$x^2 + 2 + \frac{1}{x^2 + 2} - 2$$

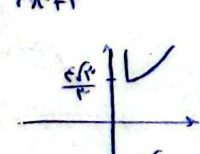
$$\min(x^2 + 2) = 2$$



$$R_f = [\frac{1}{2}, +\infty)$$

جواب

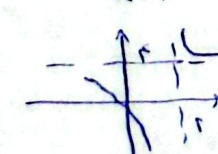
$$\frac{x^2 + 2}{\sqrt{x^2 + 2}} = \sqrt{x^2 + 2} + \frac{1}{\sqrt{x^2 + 2}}$$



$$R_f = [\frac{2\sqrt{2}}{3}, +\infty)$$

جواب

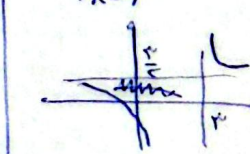
$$y = \sqrt{\frac{x^2 + 1}{x - 2}}$$



$$R_y = [0, +\infty) - \{2\}$$

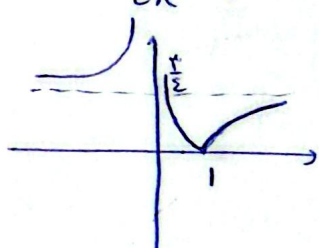
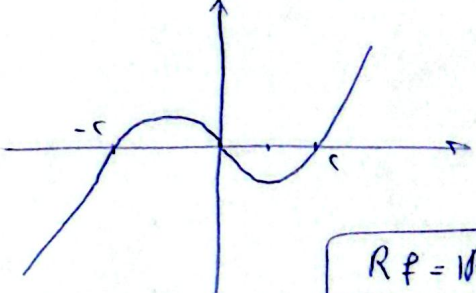
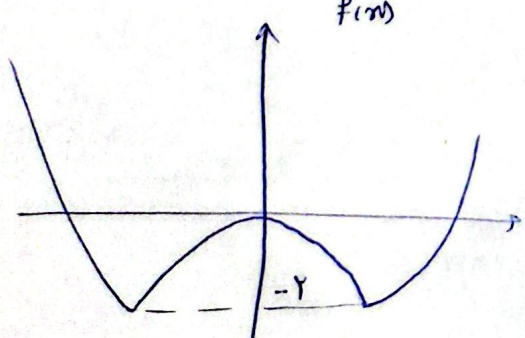
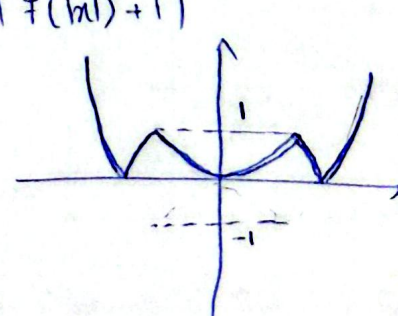
جواب

$$y = \frac{2x + 1}{2x - 4} \quad (\text{الف})$$



$$R_f = \mathbb{R} - \{\frac{1}{2}\}$$

جواب

$y = \frac{3x^r + \varepsilon}{x^r - 1} \rightarrow yx^r - y = 3x^r + \varepsilon \rightarrow (3-y)x^r + y + \varepsilon = 0$ $\Delta \text{ مثبتی} \rightarrow \pm \frac{\sqrt{4(y+\varepsilon)(y-3)}}{4-2y} \rightarrow (y+\varepsilon)(y-3) \geq 0 \quad \frac{-\varepsilon}{1-1} + \frac{3}{1-1} +$ $y \neq 3$	روش اولی $R_f = (-\infty, -\varepsilon] \cup (3, +\infty)$ جواب ۶
$y = \frac{3x^r + \varepsilon}{x^r - 1}$ $\begin{matrix} \min x^r \\ 0 \end{matrix} \rightarrow -\varepsilon$ $\begin{matrix} \max x^r \\ +\infty \end{matrix} \rightarrow 3$ $R_f = (-\infty, -\varepsilon] \cup (3, +\infty)$ روش تذکر ۲	
$y = \frac{2 \sin x + \varepsilon}{\sin x - 3}$ $\begin{matrix} \max \sin x \\ 1 \end{matrix} \rightarrow \frac{2+\varepsilon}{1-3} = \frac{\varepsilon}{-2} = -\frac{1}{2}$ $\begin{matrix} \min \sin x \\ -1 \end{matrix} \rightarrow \frac{-2+\varepsilon}{-1-3} = \frac{\varepsilon}{-4} = -\frac{1}{4}$ $R_f = [-\frac{1}{4}, -\frac{1}{2}]$ استخراج صغری شود	۷
$y = \sqrt{\frac{9x-11}{5x-11}} = \sqrt{\frac{9(x-c)}{5(x-c)}}$ $R_f = \left\{ \frac{11}{5} \right\}$ (ب)	(الف) $y = \left \frac{3x-1}{5x} \right $  $R_f = [0, +\infty)$ ۸
$y = x x - 2x$ $x \geq 0 \rightarrow x^2 - 2x = x(x-2)$ $x < 0 \rightarrow -x^2 - 2x = -x(x+2)$	 $R_f = \mathbb{R}$ ۹
 $f(x)$	 $ f(x)+1 $ ۱۰