

11/10

تکلیف چهارم 9

"نمار خدا"

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

ب) $y = x^3 + 1 \rightarrow x^3 = y - 1 \rightarrow x = \sqrt[3]{y-1} \rightarrow Rf = \mathbb{R}$ ✓

2- الف) $y = x^2 - 4x + 9 \Rightarrow y = x^2 - 4x + 4 + 5 \rightarrow y = (x-2)^2 + 5, (x-2)^2 = y - 5$
 $\rightarrow x-2 = \sqrt{y-5}, y-5 \geq 0 \rightarrow y \geq 5 \rightarrow Rf = [5, +\infty)$ ✓

ب) $y = x^2 - 8x + 1 \rightarrow y = (x-4)^2 - 15, (x-4)^2 = y + 15$
 $\rightarrow (x-4)^2 = \sqrt{y+15}, y+15 \geq 0 \rightarrow y \geq -15 \rightarrow Rf = [-15, +\infty)$ ✓

3- الف) $y = \frac{x^2 + 3}{x^2 - 2} \rightarrow yx^2 - 2y = x^2 + 3 \rightarrow yx^2 - x^2 = 2y + 3$

$\rightarrow x^2(y-2) = 2y+3 \rightarrow x^2 = \frac{2y+3}{y-2}, x = \sqrt{\frac{2y+3}{y-2}} \geq 0$

$\frac{y-1/5}{+1-1/5} \rightarrow Rf = (-\infty, -1/5] \cup (1, +\infty)$ ✓

ب) $\frac{2|x|+1}{|x|-4} = y \rightarrow y|x|-4y = 2|x|+1 \rightarrow y|x|-2|x| = 4y+1$

$\rightarrow |x|(y-2) = 4y+1 \rightarrow |x| = \frac{4y+1}{y-2}, \frac{4y+1}{y-2} \geq 0$

$\frac{y-1/4}{+1-1/4} \rightarrow Rf = (-\infty, 1/4] \cup (2, +\infty)$ ✓

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$$x = \frac{ty \pm \sqrt{14y^2 + ty}}{ty} \xrightarrow{y \neq 0} 14y^2 + ty \geq 0 \rightarrow ty(ty+1) \geq 0$$

$$\begin{array}{c} -1/4 \quad 0 \\ + \quad | \quad - \quad | \quad + \end{array}$$

$$y = \frac{1}{x^2 - 4x} \rightarrow y = \frac{1}{(x-2)^2 - 4} \rightarrow Df = \left(+\infty, +\infty \right) \cup (-\infty, 0)$$

$$Rf = (-\infty, -\frac{1}{4}] \cup (0, +\infty)$$

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$$Rf = \frac{1}{Df} = \left(\frac{1}{4}, +\infty \right) \cup (-\infty, 0)$$

$$\text{الف) } y = x^2 - 4x + 2 \rightarrow x = \frac{-b}{2a} = \frac{4}{2} = 2 \rightarrow y_{\min} = -2$$

$$\rightarrow Rf = [-2, +\infty)$$

$$\text{ب) } y = -x^2 + 4x + 2 \rightarrow x = \frac{-b}{2a} = 2 \rightarrow y_{\max} = 6 \rightarrow Rf = (-\infty, 6]$$

$$\text{الف) } y = \sqrt{x^2 - 4x + 2} \rightarrow x = \frac{-b}{2a} = 2, y_{\min} = -2$$

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

$$\text{ب) } y = \sqrt{-x^2 + 4x + 2} \rightarrow x = \frac{-b}{2a} = 2 \rightarrow y_{\max} = \sqrt{6}$$

$$Rf = \sqrt{[-\infty, +\sqrt{6}]} = [0, \sqrt{6}]$$

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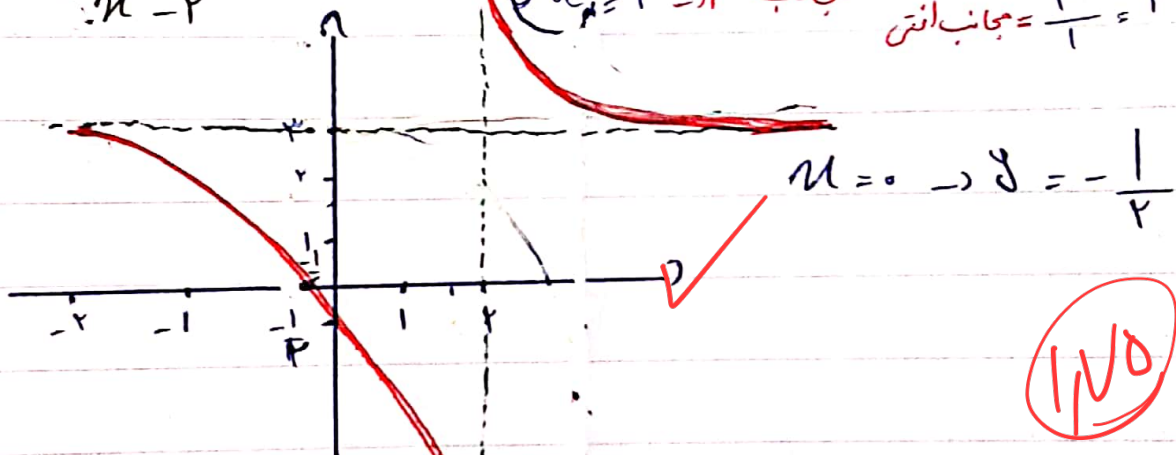
الف) $y = x^5 + 3x^4 + 2x + 1$ $\xrightarrow{\text{بزرگترین توان x}} \boxed{Rf = \mathbb{R}}$ ✓

ب) $y = \sqrt{x^5 + 3x^4 + 2x + 1}$ $\rightarrow \boxed{Rf = \sqrt{R} = [0, +\infty)}$ ✓ (2)

الف) $y = \frac{3x+1}{x-2}$ $\xrightarrow{\text{هموار کنید}} \boxed{Rf = R - \left\{\frac{3}{1}\right\}}$ ✓

ب) $y = \sqrt{\frac{3x+1}{x+3}}$ $\xrightarrow{\text{هموار کنید}} \boxed{Rf = \sqrt{R - \{4\}} = [0, +\infty) - \{2\}}$ ✓ (2)

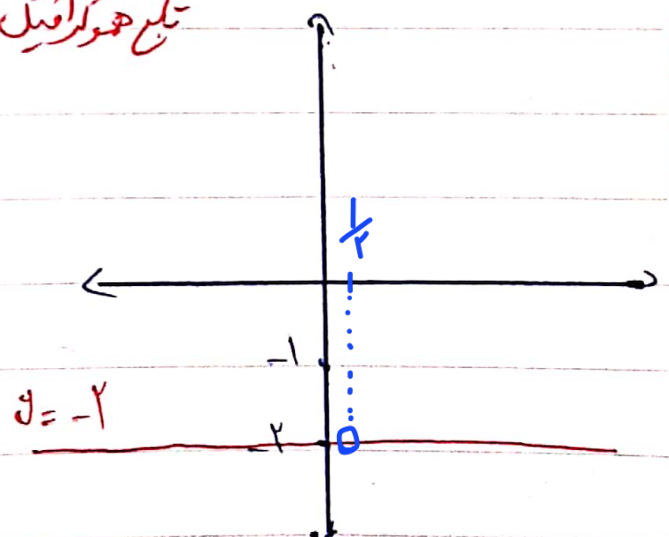
الف) $y = \frac{3x+1}{x-2}$ $\xrightarrow{\text{تایید هموار کنید}} \begin{cases} \text{صورت تابع} \rightarrow x = -1 \rightarrow y = -\frac{1}{3} \\ \text{مخرج تابع} \rightarrow x = 2 \end{cases}$



ب) $y = \frac{4x-2}{1-2x}$ $\xrightarrow{\text{تایید هموار کنید نیست}}$

$\rightarrow y = \frac{4x-2}{-2x+1} = -2$ ✓

$x \neq \frac{1}{2}$



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$$1) y = \cos^r x + \frac{1}{\cos^r x} \quad \frac{\cos^r x > 0}{a + \frac{1}{a}} \rightarrow \boxed{Rf = [r, +\infty)} \quad -1.$$

$$2) y = \sqrt[r]{\frac{x^r + 1}{x}} \rightarrow \frac{x^r}{x} + \frac{1}{x} = x + \frac{1}{x} \quad \frac{x > 0, x < 0}{a + \frac{1}{a}}$$

$$\boxed{Rf = (-\infty, r] \cup [r, +\infty)}$$

$$Rf = (-\infty, \sqrt[r]{-r}] \cup [\sqrt[r]{r}, +\infty)$$