

$$الف) y = \sqrt{x+1}$$

$$Rf = R - \left\{ \frac{1}{2} \right\}$$

تلف 3، 9

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درستی و نادرستی

$$الف) y = x^2 - 1 \rightarrow x^2 - 1 = y = \sqrt{x^2 - 1} - 1$$

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

$$Rf = [-1, +\infty)$$

$$ب) y = x^2 + 1 \rightarrow y - 1 = x^2 \rightarrow \sqrt{y-1} = x$$

$$Rf = R$$

چند مرتبه 2 تا 3 روی داشته ندارد

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

$$y - 2 = (x-1)^2 \Rightarrow \sqrt{y-2} = \sqrt{(x-1)^2} \Rightarrow \sqrt{y-2} + 1 = x$$

$$\rightarrow y - 2 \geq 0 \rightarrow Rf = [2, +\infty)$$

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

$$\rightarrow y = (x-1)^2 \rightarrow y \geq 0 \rightarrow Rf = [0, +\infty)$$

$$\rightarrow y + 1, 2 \geq 0 \rightarrow y \geq -1, 2 \rightarrow Rf = [-1, 2, +\infty)$$

$$الف) y = \frac{x^2 + 1}{x^2 - 1}$$

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

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

$$Rf = (1, +\infty)$$

$$\frac{x}{1} \mid \frac{1}{-1}$$

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

$$1-y \neq 0 \rightarrow y \neq 1 \rightarrow Rf = R - \{1\}$$

$$y = \frac{1}{x^2 - 4x} \rightarrow \cancel{f(x) = x^2 - 4x} \quad \cancel{f(x) = (x-2)(x-4)}$$

$$\cancel{\frac{1}{x^2 - 4x} = \frac{1}{(x-2)(x-4)} \rightarrow \frac{1}{x-2} - \frac{1}{x-4}}$$

$$\cancel{x = \frac{1}{x^2 - 4x} \rightarrow \frac{1}{x} = x^2 - 4x \rightarrow \frac{1}{x} = x(x-4)}$$

$$\cancel{\frac{1}{x} = x^2 - 4x} \Rightarrow y = \frac{1}{(x-2)^2 - 4}$$

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

$$\text{الف) } y = x^2 - 4x + 2 \xrightarrow{a > 0} \begin{cases} x_{\min} = \frac{-b}{2a} = \frac{4}{2} = 2 \\ y_{\min} = -1 \end{cases} \rightarrow Rf = [-1, +\infty)$$

$$\text{ب) } y = -x^2 + 4x + 2 \xrightarrow{a < 0} \begin{cases} x_{\max} = \frac{-b}{2a} = \frac{-4}{-2} = 2 \\ y_{\max} = 6 \end{cases} \rightarrow Rf = (-\infty, 6]$$

$$\text{الف) } y = \sqrt{x^2 - 4x + 2} \xrightarrow{a > 0} \begin{cases} x_{\min} = \frac{-b}{2a} = \frac{4}{2} = 2 \\ y_{\min} = -1 \end{cases} \rightarrow Rf = \sqrt{[-1, +\infty)}$$

چون اعداد منفي جزر نمی دهند
از ۰ شروع می کنیم.

$$\rightarrow Rf = [0, +\infty)$$

$$\text{ب) } y = \sqrt{-x^2 + 4x + 10} \xrightarrow{a < 0} \begin{cases} x_{\max} = \frac{-b}{2a} = \frac{-4}{-2} = 2 \\ y_{\max} = 14 \end{cases} \rightarrow Rf = \sqrt{(-\infty, 14]}$$

چون اعداد منفي جزر نمی دهند
از ۰ شروع می کنیم.

$$\rightarrow Rf = [0, \sqrt{14}]$$

$$\text{الف) } x^4 + 3x^3 + 2x^2 + 1 = y \rightarrow Rf = \mathbb{R}$$

$$\text{ب) } y = \sqrt{x^4 + 4x^2 + 4x + 1} \rightarrow Rf = [0, +\infty)$$

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الف) $y = \frac{2x+1}{x-2}$ $Rf = R - \left\{ \frac{a}{c} \right\}$

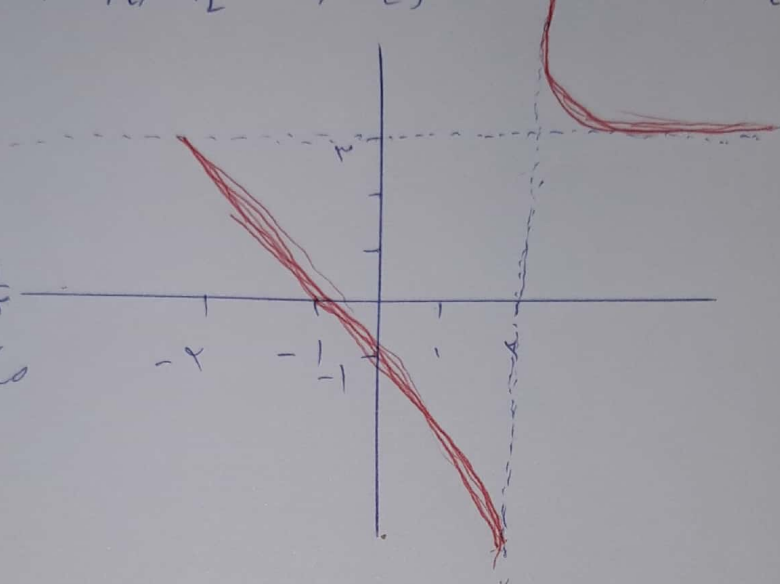
$\rightarrow Rf = R - \left\{ \frac{1}{-1} \right\} \Rightarrow Rf = R - \left\{ -1 \right\}$

ب) $y = \sqrt{\frac{2x+1}{x+3}}$ $\rightarrow Rf = [0, +\infty) - \left\{ \frac{1}{2} \right\} = Rf = [0, +\infty) - \left\{ \frac{1}{2} \right\}$

الف) $y = \frac{2x+1}{x-2}$

ب) $\begin{cases} 2x+1=0 \\ 2x=1 \rightarrow x=-\frac{1}{2} \end{cases}$
 $\rightarrow x=-2$ صفر
موجب

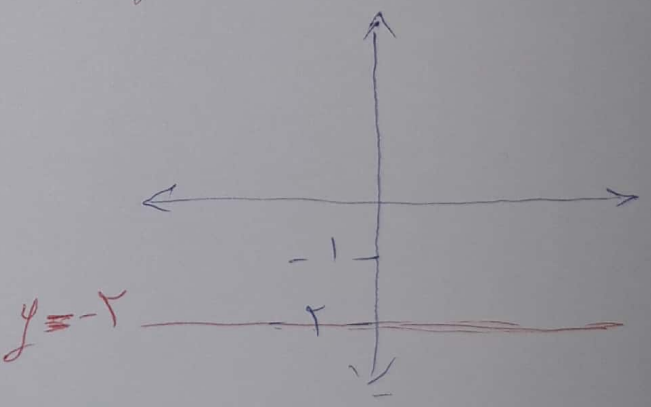
موجب $\frac{2}{1} = 2$
 افقي



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ب) $y = \frac{2x-2}{1-2x}$ $\rightarrow$ تابع متعكس

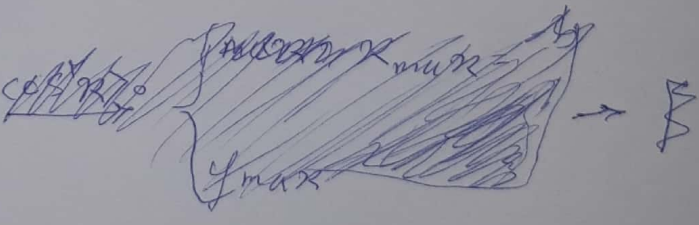
$y = \frac{2x-2}{-2x+1} = -2$



الف) $y = \cos^2 x + \frac{1}{\cos^2 x}$

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

ب) $y = \frac{\sqrt{x^2+1}}{x}$ $\rightarrow Rf = R - \{0\}$



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