

$$(x-1)^3 + 1 = y \Rightarrow (x-1)^3 = y-1 \Rightarrow x-1 = \sqrt[3]{y-1} \Rightarrow x = \sqrt[3]{y-1} + 1$$

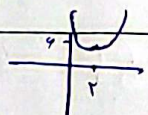
$$\Rightarrow R_f = \mathbb{R}$$

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

$$\Rightarrow (x-1)^2 = \frac{1+y}{y} \Rightarrow x-1 = \sqrt{\frac{1+y}{y}} \Rightarrow x = \sqrt{\frac{1+y}{y}} + 1 \Rightarrow R_f = \frac{-1}{+4-4} \Rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$$

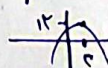
$$x_{\min} = \frac{-b}{2a}$$

$$y = x^2 - 4x + 1 \quad \begin{cases} x_{\min} = 2 \\ y_{\min} = -3 \end{cases}$$



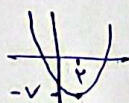
$$R_f = [1, +\infty)$$

$$y = -x^2 + 4x + 2 \quad \begin{cases} x_{\max} = 2 \\ y_{\max} = 10 \end{cases}$$



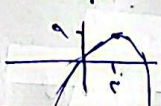
$$R_f = (-\infty, 10]$$

$$y = \sqrt{x^2 - 4x - 2} \quad \begin{cases} x_{\min} = 2 \\ y_{\min} = -\sqrt{2} \end{cases}$$



$$R_f = (-\sqrt{2}, +\infty) \xrightarrow{\text{رادیكال}} [0, +\infty)$$

$$y = \sqrt{-x^2 + 4x + 2} \quad \begin{cases} x_{\max} = 2 \\ y_{\max} = \sqrt{10} \end{cases}$$



$$R_f = (-\infty, \sqrt{10}] \xrightarrow{\text{رادیكال}} [0, 3]$$

$$R_f = \mathbb{R} \Rightarrow \text{فونکشن برترین توان فرد است و محدودیت هم ندارد}$$

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$$R_f = \mathbb{R} \xrightarrow{\text{رادیكال}} [0, +\infty)$$

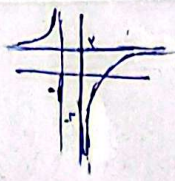
$$R_f = [0, +\infty) \rightarrow \text{فونکشن توان ۲ است}$$

$$y = \frac{x+1}{x-2} \Rightarrow R_f = \mathbb{R} - \left\{\frac{1}{2}\right\} \Rightarrow R_f = \mathbb{R} - \{2\}$$

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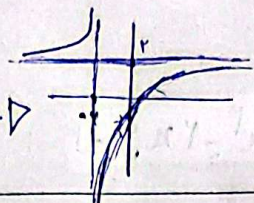
$$y = \sqrt{\frac{x+1}{x+1}} \Rightarrow \text{رادیكال} R_f = \mathbb{R} - \left\{\frac{1}{2}\right\} \Rightarrow R_f = \mathbb{R} - \{2\} \xrightarrow{\text{رادیكال}} [0, +\infty) - \{\sqrt{2}\}$$

$$y = \sqrt{\frac{x+1}{x-2}} \Rightarrow \text{رادیكال} R_f = \mathbb{R} - \left\{\frac{1}{2}\right\} \Rightarrow R_f = \mathbb{R} - \{2\} \xrightarrow{\text{رادیكال}} [0, +\infty) - \{\sqrt{2}\}$$

$$\frac{2x-3}{x+1} \begin{cases} \text{مجاہب قائم: } x+1=0 \Rightarrow x=-1 \\ \text{مجاہب افق: } \frac{a}{c} = 2 \end{cases} \Rightarrow$$


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$$\frac{2x-1}{x+2} \begin{cases} \text{مجاہب قائم: } x=-2 \\ \text{مجاہب افق: } \frac{a}{c} = 2 \end{cases} \Rightarrow$$


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$$\sin x + \frac{1}{\sin x} \geq a + \frac{1}{a} \begin{cases} \text{مجاہب قائم: } a > 0 \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty) \\ \text{مجاہب قائم: } a < 0 \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty) \end{cases}$$

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$$\frac{x^2+1}{x^3} = x^2 + \frac{1}{x^3} \begin{cases} \text{مجاہب قائم: } a > 0 \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty) \\ \text{مجاہب قائم: } a < 0 \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty) \end{cases}$$

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$$\frac{\sqrt{x^2+1}}{\sqrt{x}} = \sqrt{x} + \frac{1}{\sqrt{x}} \begin{cases} \text{مجاہب قائم: } a > 0 \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty) \\ \text{مجاہب قائم: } a < 0 \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty) \end{cases}$$

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$$\sqrt{x} + \frac{1}{\sqrt{x}} \begin{cases} \text{مجاہب قائم: } a > 0 \Rightarrow R_f = [2, +\infty) \\ \text{مجاہب قائم: } a < 0 \Rightarrow R_f = (-\infty, -2] \end{cases}$$

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$$x^2+2 + \frac{1}{x^2+2} - 3 \begin{cases} \text{مجاہب قائم: } a > 0 \Rightarrow R_f = [\frac{1}{3}, +\infty) \\ \text{مجاہب قائم: } a < 0 \Rightarrow R_f = (-\infty, -\frac{1}{3}] \end{cases}$$

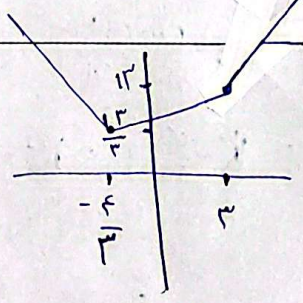
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$$\frac{x^2+4+1}{\sqrt{x^2+4}} = \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}} \begin{cases} \text{مجاہب قائم: } a > 0 \Rightarrow R_f = [\frac{2}{\sqrt{5}}, +\infty) \\ \text{مجاہب قائم: } a < 0 \Rightarrow R_f = (-\infty, -\frac{2}{\sqrt{5}}] \end{cases}$$

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$$y = |x-3| + |2x+4|$$

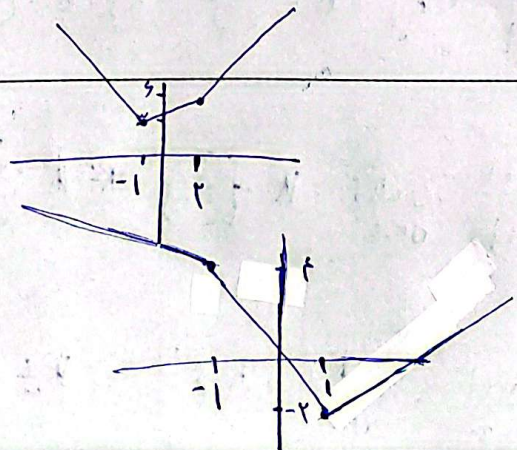
$$\begin{array}{c} \frac{2x-3}{-x-1} \quad \frac{2x-3}{2x+6} \quad \frac{2x-3}{2x+1} \\ \hline -x-1 \quad 2x+6 \quad 2x+1 \end{array}$$



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$$\frac{2x-3}{-x-1} \quad \frac{2x-3}{2x+6} \quad \frac{2x-3}{2x+1}$$

$$\frac{2x-3}{-x-1} \quad \frac{2x-3}{2x+6} \quad \frac{2x-3}{2x+1}$$



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