۶

الف) $y=\frac{2x-4}{x+1}$

$\frac{a}{c}=2$

$x=1 \Rightarrow y=\frac{1}{4}$

$x=-1$ ریشه مخرج

ب) $y=\frac{2x-1}{x+2}$

$\frac{a}{c}=2$

$x=1 \Rightarrow y=\frac{1}{3}$

$x=-2$ ریشه مخرج

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الف) $y=\sin x+\frac{1}{\sin x} \Rightarrow R_f=(-\infty,-2]\cup[2,+\infty)$

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

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

د) $y=\sqrt{x}+\frac{1}{\sqrt{x}} \Rightarrow R_f=[2,+\infty)$

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الف) $y=x^2+\frac{1}{x^2+4} \Rightarrow y=x^2+4\frac{1}{x^2+4}-4 \Rightarrow R_f=[\frac{1}{4},+\infty)$

$\Rightarrow \min y=4+\frac{1}{4}-4=\frac{1}{4}$

ب) $x=\frac{x^2+5}{\sqrt{x^2+3}} \Rightarrow y=\frac{x^2+3+1}{\sqrt{x^2+3}} \Rightarrow y=\sqrt{x^2+3}+\frac{1}{\sqrt{x^2+3}}$

$\Rightarrow R_f=[2,+\infty)$

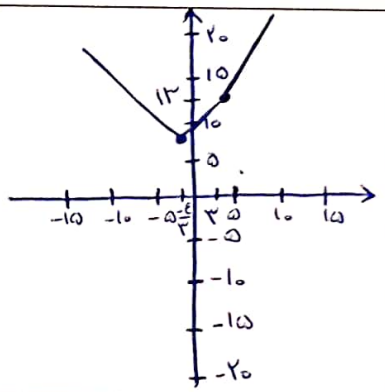
$\Rightarrow \min y=\sqrt{3}+\frac{1}{\sqrt{3}}=2+\frac{1}{2} \Rightarrow R_f=[\frac{5}{2},+\infty)$

چون $a=\sqrt{x^2+3}=1$ نیست ✗

۹

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

$\begin{cases} x-4+2x+4 & x>4 \\ 4+x-3+2x & 4\le x\le -\frac{4}{3} \\ -x-4-2x-3 & x<-\frac{4}{3} \end{cases} \Rightarrow \begin{cases} 3x+1 & x>4 \\ 2x+1 & 4\le x\le -\frac{4}{3} \\ -3x+1 & x<-\frac{4}{3} \end{cases}$

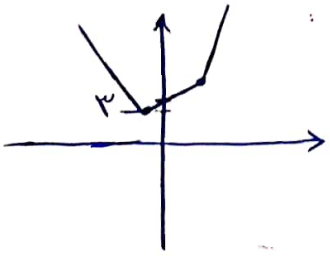



۱۰

الف) $y=|x-2|+|2x+2|$

$\begin{cases} 3x & x>2 \\ x+3 & 2\ge x\ge -1 \\ -3x & x<-1 \end{cases}$

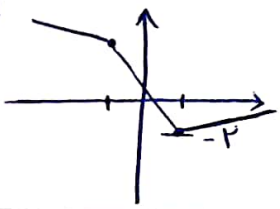
$R_f=[3,+\infty)$




ج) $y=|2x-1|-|x+1|$

$\begin{cases} x-2 & x>1 \\ -3x+1 & 1\ge x\ge -1 \\ -x+2 & x<-1 \end{cases}$

$R_f=[-2,+\infty)$



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الف) $y = x^3 - 3x^2 + 3x \Rightarrow y-1 = x^3 - 3x^2 + 3x - 1 \Rightarrow y-1 = (x-1)^3 \Rightarrow \sqrt[3]{y-1} = x-1$

$\Rightarrow x = \sqrt[3]{y-1} + 1 \Rightarrow R_f = \mathbb{R}$

ب) $y = \frac{1}{x^2 - 2x} \Rightarrow yx^2 - 2yx - 1 = 0 \Rightarrow \Delta = 4y^2 + 4y \Rightarrow x = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y}$

$\Rightarrow y \neq 0 \;,\; 4y^2 + 4y \geq 0 \Rightarrow y^2 + y \geq 0 \Rightarrow$

| | | -1 | | 0 | |
|---|---|---|---|---|---|
| $P \geq 0$ | | + | 0 | − | 0 | + |

$\Rightarrow R_f = (-\infty, -1] \cup [0, +\infty)$

۲

الف) $y = x^2 - 4x + 10 \xrightarrow{a>0} \begin{cases} x_{min} = \frac{-b}{2a} = 2 \\ y_{min} = y^{(2a)} \end{cases} \Rightarrow R_f = [6, +\infty)$

ب) $y = -x^2 + 6x + 4 \xrightarrow{a<0} \begin{cases} x_{max} = \frac{-b}{2a} = 3 \\ y_{max} = 13 \end{cases} \Rightarrow R_f = (-\infty, 13]$

ج) $y = \sqrt{x^2 - 4x - 3} \xrightarrow{a>0} \begin{cases} x_{min} = \frac{-b}{2a} = 2 \\ y_{min} = -7 \end{cases} \Rightarrow R_f = \sqrt{[-7, +\infty)} = [0, +\infty)$

د) $y = \sqrt{6x - x^2} \xrightarrow{a<0} \begin{cases} x_{max} = \frac{-b}{2a} = 3 \\ y_{max} = 9 \end{cases} \Rightarrow R_f = \sqrt{(-\infty, 9]} \Rightarrow R_f = [0, 3]$

۳

الف) $y = x^3 - 5x^2 + 2x + 1 \quad R_f = \mathbb{R}$

ب) $y = x^7 - 6x^4 + 3x + 2 \quad R_f = \mathbb{R}$

ج) $y = \sqrt{x^7 - 6x^2 + 5x + 1} \quad R_f = [0, +\infty)$

د) $y = \left(x^5 - 4x^2 + 3x + 1\right)^2 \quad R_f = (\mathbb{R})^2 = [0, +\infty)$

۴

الف) $y = \frac{3x+1}{x+2} \quad R_f = R - \left\{\frac{a}{c}\right\} = \mathbb{R} - \{3\}$

ب) $y = \frac{2x+10}{x+1} \quad R_f = R - \left\{\frac{a}{c}\right\} = \mathbb{R} - \{2\}$

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الف) $y = \sqrt{\frac{2x+6}{x+1}} \Rightarrow R_f = \sqrt{\mathbb{R} - \{2\}} = [0, +\infty) - \{\sqrt{2}\}$

ب) $y = \sqrt{\frac{3x+1}{2-x}} \Rightarrow R_f = \sqrt{\mathbb{R} - \{-3\}} = [0, +\infty).$