

10, 1, 10

الف) $y = x^2 - 3x + 3 \rightarrow y = x(x^2 - 3x + 3) \rightarrow \frac{y}{x} = (x^2 - 3x + 3)$
 $\Rightarrow \frac{1}{x} = \frac{x^2 - 3x + 3}{y} \Rightarrow x = \frac{y}{x^2 - 3x + 3} \Rightarrow R_f = \mathbb{R}$

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ب) $yx^2 - 2yx = 1 \rightarrow x(yx - 2y) = 1 \rightarrow yx - 2y = \frac{1}{x} \rightarrow yx = \frac{1}{x} + 2y$
 $\frac{yx}{1} = \frac{1 + 2xy}{x} = yx^2 = 1 + 2xy \rightarrow x^2 = \frac{1 + 2xy}{y} \Rightarrow R_f = \mathbb{R} - \{0\}$

$f_y(y+1) \geq -$

$R \rightarrow (-\infty, -1] \cup (1, +\infty)$

الف) $y = x^2 - 4x + 10 \rightarrow \frac{-b}{2a} = \frac{4}{2} = 2 \rightarrow 2 \rightarrow (2, +\infty)$

ب) $y = -x^2 + 4x + 3 \Rightarrow \frac{-b}{2a} = \frac{-4}{-2} = 2 \rightarrow 2 \rightarrow (-\infty, 2]$

ج) $y = \sqrt{x^2 - 4x - 3} \rightarrow \frac{-b}{2a} = \frac{4}{2} = 2 \rightarrow -2 \rightarrow \sqrt{[-2, +\infty)} = (0, +\infty)$

د) $y = \sqrt{4x - x^2} \rightarrow \frac{-b}{2a} = \frac{-4}{-2} = 2 \rightarrow 2 \rightarrow \sqrt{(-\infty, 2]} \rightarrow [0, 2]$

الف) $R_f = \mathbb{R}$

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ج) $R_f = \mathbb{R}^+, \{0\}$

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الف) $\frac{x+1}{x-2} \rightarrow R_f = \mathbb{R} - \left\{\frac{1}{2}\right\} \rightarrow R_f = \mathbb{R} - \{3\}$

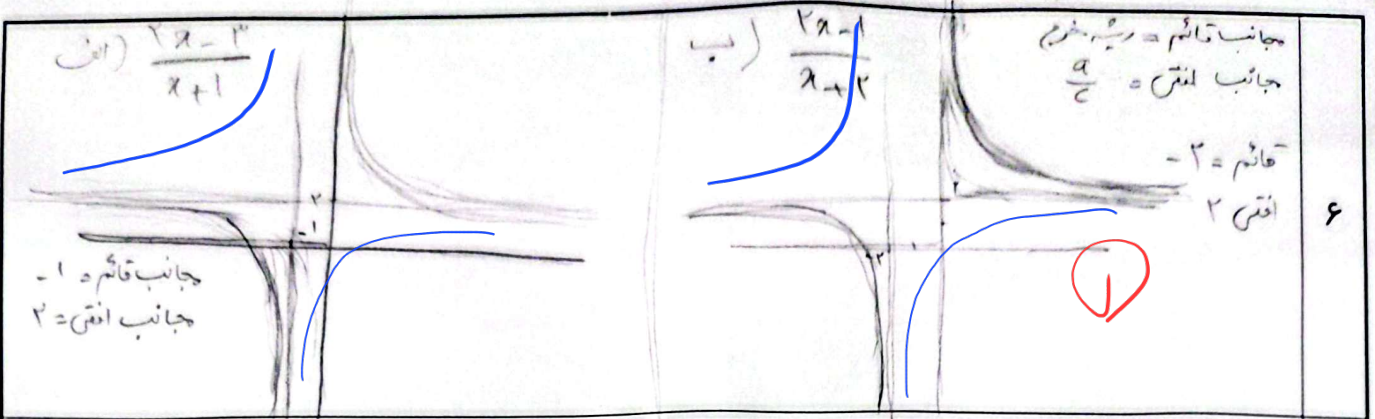
ب) $\frac{x+1}{x+1} \rightarrow R_f = \mathbb{R} - \left\{\frac{1}{2}\right\} \rightarrow R_f = \mathbb{R} - \{2\}$

الف) $\sqrt{\frac{x+1}{x+1}} \rightarrow R_f = \sqrt{\mathbb{R} - \left\{\frac{1}{2}\right\}} \rightarrow \mathbb{R} - \{5, 2\}$

ب) $\sqrt{\frac{x+1}{x-2}} \rightarrow \frac{x+1}{x-2} \rightarrow R_f = \mathbb{R} - \{-3\} \rightarrow R_f = \mathbb{R} - \{0\}$

$[0, +\infty)$

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

ب) $y = \frac{x^4+1}{x^3} = \frac{x^4}{x^3} + \frac{1}{x^3} \Rightarrow x + \frac{1}{x^3} \Rightarrow (-\infty, -2] \cup [2, +\infty)$

ج) $y = \frac{\sqrt[3]{x^2+1}}{\sqrt[3]{x}} = \frac{\sqrt[3]{x^2}}{\sqrt[3]{x}} + \frac{1}{\sqrt[3]{x}} \Rightarrow \sqrt[3]{x} + \frac{1}{\sqrt[3]{x}} = (-\infty, -2] \cup [2, +\infty)$

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

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الف) $y = x^2 + \frac{1}{x^2+3} = y = \frac{x^4 + 3x^2 + 1}{x^2+3} = yx^2 + 3y = x^4 + 3x^2 + 1$

$yx^2 - 3x^2 = x^4 - 3y + 1 \Rightarrow x^2(y-3) = x^4 - 3y + 1 \Rightarrow x^2 = \frac{x^4 - 3y + 1}{y-3}$

ب) $y = \frac{x^2+5}{\sqrt{x^2+4}} \Rightarrow y = \frac{x^4+20+10x^2}{x^2+4} = yx^2+4y = x^4+20+10x^2 \Rightarrow yx^2-10x^2 = x^4+20-4y$

$x^2(y-10) = x^4+20-4y = x^2 = \frac{x^4+20-4y}{y-10} = R_f = \sqrt{R - \{10\}} = R - \{10\}$

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

$\begin{cases} x > 3 & x-3+3x+4 \rightarrow 4x+1 \\ \frac{4}{3} < x \leq 3 & -x+3+3x+4 \rightarrow 2x+7 \\ x \leq \frac{4}{3} & -x+3-3x-4 \rightarrow -4x-1 \end{cases}$

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الف) $y = |x-2| + |2x+2|$

$2 - (-1) = 3 \rightarrow R_f = [3, +\infty)$

ب) $|2x-2| - |x+1|$

$\Rightarrow K = |1 - (-1)| = K = 2 \rightarrow R_f = [-2, 2]$

در تابع گدازی برد از اختلاف دو ریشه سرد می شود

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$$x^r + r + \frac{1}{x^r + r} - r \xrightarrow{x^r = -} \frac{1}{r} \quad R = \left[\frac{1}{r}, +\infty\right)$$

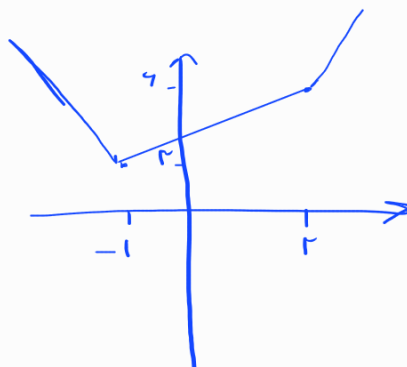
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$$\sqrt{x^r + r} + \frac{1}{\sqrt{x^r + r}} \xrightarrow{x^r = 0} \frac{2}{r} \quad R = \left[\frac{2}{r}, +\infty\right)$$

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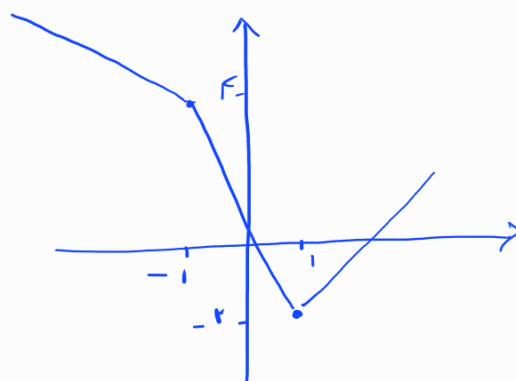
$$\begin{array}{c|c|c} -1 & & r \\ \hline -r & x+r & r \end{array}$$



$$R = [r, +\infty)$$

$$\begin{array}{c|c|c} -1 & & 1 \\ \hline -x+r & -r \end{array}$$

$$R = [-r, +\infty)$$



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