

الف) $x^3 - 3x^2 + 3x \pm 1 \rightarrow (x-1)^3 + 1 = y \rightarrow (x-1)^3 = y-1 \rightarrow x-1 = \sqrt[3]{y-1}$ (175)
 $R_f = \mathbb{R}$ ✓

ب) $yx^2 - 2xy = 1 \rightarrow x(yx - 2y) = 1$ (2)
 این دو باره محوره ها را حسب کوی ما ی رو در خواهم

الف) $y = x^2 - 2x + 1$ $\frac{-b}{2a} = \frac{2}{2} = 1 \rightarrow 1 - 1 + 1 = 1$ $R_f = [1, +\infty)$ ✓

ب) $y = -x^2 + 4x + 3$ $\frac{-b}{2a} = \frac{-4}{-2} = 2 \rightarrow -9 + 16 + 3 = 10$ $R_f = (-\infty, 10]$ ✓

ج) $\sqrt{x^2 - 4x - 3}$ $\frac{-b}{2a} = \frac{2}{1} = 2 \rightarrow 4 - 1 - 3 = 0$ $R_f = [0, +\infty)$ ✓

د) $\sqrt{4x - x^2}$ $\frac{-b}{2a} = \frac{-4}{-2} = 2 \rightarrow 16 - 9 = 9$ $R_f = [0, 3]$ ✓

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

ب) $y = x^2 + 4x^2 + 2x + 1$ $R_f = \mathbb{R}$ ✓

ج) $\sqrt{x^2 - 4x^2 + 2x + 1}$ $R_f = [0, +\infty)$ ✓

د) $y = (x^2 - 2x^2 + 2x + 1)^2$ $R_f = [0, +\infty)$ ✓

الف) $y = \frac{x+1}{x-2} \rightarrow \mathbb{R} - \{\frac{a}{c}\}$ $R_f = \mathbb{R} - \{2\}$ ✓ (2) - 4

ب) $y = \frac{2x+1}{x+1} \rightarrow \mathbb{R} - \{\frac{a}{c}\}$ $R_f = \mathbb{R} - \{2\}$ ✓

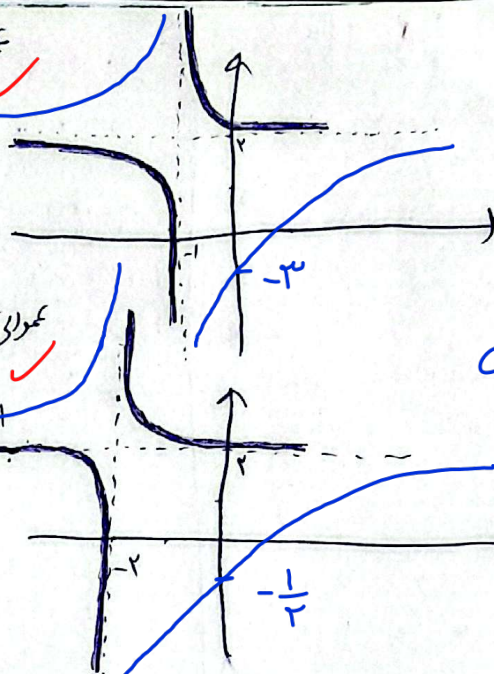
الف) $y = \sqrt{\frac{2x+5}{x+1}} \rightarrow x = \sqrt{\frac{-y+5}{y-2}}$ $\frac{+5}{-2} + \frac{+5}{-2} = \mathbb{R} - \{\frac{a}{c}\} = 2$ (2)
 $R_f = \cancel{[2, 5]} (2, 5)$ $R_f = [0, +\infty) - \{2\}$ ✓

ب) $y = \sqrt{\frac{2x+1}{-x+2}} \rightarrow x = \sqrt{\frac{-2y+1}{-y-2}}$ $\frac{-2}{+1} + \frac{+1}{-2} = \mathbb{R} - \{\frac{a}{c}\}$

$R_f = (-\infty, -2) \cup [\frac{1}{2}, +\infty)$ $R_f = [0, +\infty)$ ✓

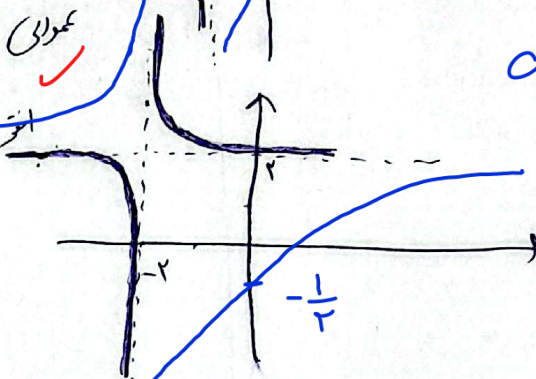
$$y = \frac{2x-3}{x+1}$$

عمودی $x = -1$
افقی $y = \frac{a}{c} = 2$



(1) - 4

ب) $y = \frac{2x-1}{x+2}$ عمودی $x = -2$
افقی $y = \frac{a}{c} = \frac{1}{2}$



$$ad - bc > 0$$

همه دوسه‌وی اند

$$y = \sin x + \frac{1}{\sin x} \rightarrow R_f = [-\infty, -1] \cup [1, +\infty)$$

(2) - 5

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

ج) $\sqrt{x} + \frac{1}{\sqrt{x}} \rightarrow R_f = (-\infty, -1] \cup [1, +\infty)$

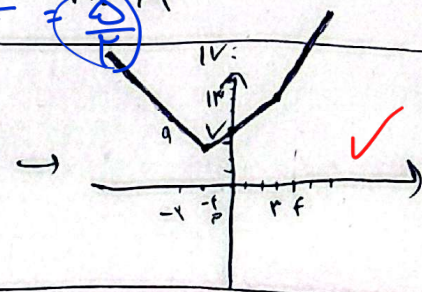
د) $\sqrt{x} + \frac{1}{\sqrt{x}} \rightarrow R_f = \text{[scribbled out]} [1, +\infty)$

الف) $x^2 + \frac{1}{x^2} + \frac{1}{x^2} \rightarrow R_f = \text{[scribbled out]} [1, +\infty)$

(3) - 1

ب) $y = \frac{x^2+4}{\sqrt{x^2+4}} \rightarrow \frac{x^2+4+1}{\sqrt{x^2+4}} \rightarrow \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}} \rightarrow R_f = [\frac{5}{2}, +\infty)$

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



(4) - 9

$\begin{cases} x-2+\sqrt{x+2} & x > 2 \\ -x+2+\sqrt{x+2} & -1 \leq x \leq 2 \\ -x+2-\sqrt{x+2} & x < -1 \end{cases} \rightarrow \begin{cases} \sqrt{x+2} & x > 2 \\ x+2 & -1 \leq x \leq 2 \\ -\sqrt{x+2} & x < -1 \end{cases}$

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

(5) - 10

$$y = |2x - 2| - |x + 1|$$

$\downarrow$ $\downarrow$
 -1 -1

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



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

$$\begin{matrix} \nearrow & -2 \\ \searrow & 3 \end{matrix}$$

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