

الف) $y = x^2 - 5 \rightarrow x^2 = y + 5 \rightarrow x^2 \geq 0 \Rightarrow y + 5 \geq 0 \rightarrow y \geq -5 \quad [-5, +\infty)$

ب) $y = x^2 + 1 \rightarrow x^2 = y - 1 \rightarrow R_f = \mathbb{R} \quad x^2 + 1 \rightarrow R_f = \mathbb{R}$

الف) $y = x^2 - 4x + 4 + 2 \rightarrow y = (x-2)^2 + 2 \rightarrow y - 2 = (x-2)^2 \rightarrow x - 2 = \pm \sqrt{y-2} \Rightarrow x = \pm \sqrt{y-2} + 2 \quad R_f = [2, +\infty)$

ب) $y = x^2 - 5x + 1 \rightarrow x^2 - 5x + (1-y) = 0 \xrightarrow{\Delta} 25 - 4(1-y) = 25 - 4 + 4y = 21 + 4y$
 $21 + 4y \geq 0 \quad 4y \geq -21 \rightarrow y \geq -\frac{21}{4} \rightarrow [-\frac{21}{4}, +\infty)$
 معادله یک جواب دارد.

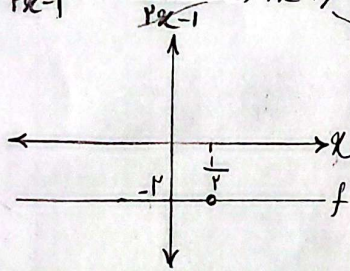
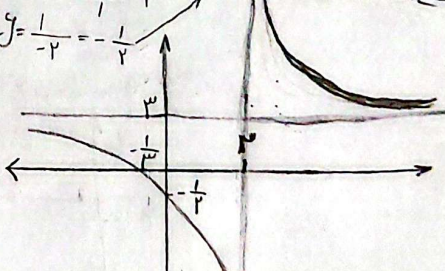
الف) $y = \frac{x^2 + 3}{x^2 - 2} \rightarrow y(x^2 - 2) = x^2 + 3 \Rightarrow yx^2 - 2y = x^2 + 3 \rightarrow yx^2 - x^2 = 2y + 3$
 $x^2(y-1) = 2y+3 \rightarrow x^2 = \frac{2y+3}{y-1} \rightarrow x^2 \geq 0 \rightarrow \frac{2y+3}{y-1} \geq 0 \quad \begin{matrix} -1.5 & 1 \\ + & - & - & + \end{matrix} \quad [-\infty, -1.5] \cup (1, +\infty)$

ب) $y = (|x| - 4) = 2|x| + 1 \rightarrow y|x| - 4y = 2|x| + 1 \rightarrow y|x| - 2|x| = 4y + 1$
 $|x|(y-2) = 4y+1 \rightarrow |x| = \frac{4y+1}{y-2} \quad |x| \geq 0 \quad \frac{4y+1}{y-2} \geq 0 \quad \begin{matrix} -\frac{1}{4} & 2 \\ + & - & - & + \end{matrix} \quad [-\infty, -\frac{1}{4}] \cup (2, +\infty)$

$y = \frac{1}{x^2 - 4x} \quad x^2 - 4x \rightarrow x(x-4) \rightarrow x \neq 0 / x \neq 4$
 $y(x^2 - 4x) = 1 \quad x^2 - 4x = \frac{1}{y} \quad \boxed{y \neq 0} \xrightarrow{\Delta} \Delta \geq 0 \quad 16 - 4(-\frac{1}{y}) \geq 0$
 $16 + \frac{4}{y} \geq 0 \quad \frac{4}{y} \geq -16$
 $y > 0 \rightarrow -4 \leq \frac{1}{y} < 0$
 $R = (-\infty, -\frac{1}{4}] \cup (0, +\infty)$
 $\boxed{y \neq \frac{1}{4}} \leftarrow \frac{1}{y} \geq -4 \leftarrow y < 0$

الف) $x^2 - 4x + 2 \rightarrow \left| \frac{-b}{2a} = \frac{4}{2} = 2 \right| \xrightarrow{a > 0} [-7, +\infty)$

ب) $-x^2 + 4x + 2 \rightarrow \left| \frac{-b}{2a} = \frac{-4}{-2} = 2 \right| \xrightarrow{a < 0} (-\infty, 6]$

الف) $\sqrt{x^2 - 4x + 2} \rightarrow \left \frac{-b}{2a} = \frac{-(-4)}{2} = 2 \right \xrightarrow{a > 0} \sqrt{[-1, 5] + \infty} \xrightarrow{\text{زیر رادیکال وجود دارد}} [0, +\infty)$ ب) $\sqrt{-x^2 + 4x + 10} \rightarrow \left \frac{-b}{2a} = \frac{-4}{-2} = 2 \right \xrightarrow{a < 0} \sqrt{(-\infty, 14]} \xrightarrow{\text{زیر رادیکال وجود دارد}} [0, \sqrt{14}]$	۶
الف) $x^v \rightarrow$ بزرگترین توان $\Rightarrow R_f = \mathbb{R}$ ب) $x^d \rightarrow$ " " " $\Rightarrow [0, +\infty)$ چون زیر رادیکال است اعداد صحیح $0 +$	۷
الف) $\frac{1}{x} \rightarrow \frac{a}{c} \rightarrow \frac{1}{1} \rightarrow \mathbb{R} - \{0\}$ ب) $\sqrt{\frac{4x+1}{x+3}} \rightarrow \frac{a}{c} = \frac{4}{1} \xrightarrow{\text{زیر رادیکال}} \sqrt{\frac{4}{1}} = 2 \rightarrow \mathbb{R} - \{2\}$	۸
الف) $1 - 2x = -(2x - 1)$ $\frac{-4x - 2}{2x - 1} = \frac{-2(2x - 1)}{2x - 1} \rightarrow 2x - 1 \neq 0 \rightarrow y = -2$ $x \neq \frac{1}{2}$ تابع در تمام نقاط $x = \frac{1}{2}$ است  ب) $x = 2 \rightarrow$ جانب عمودی افقی $\rightarrow \frac{3}{1} = 3$ $x = 0 \rightarrow y = \frac{1}{-2} = -\frac{1}{2}$ $y = 0 \rightarrow 3x + 1 = 0 \rightarrow x = -\frac{1}{3}$ 	۹
الف) $\cos^2 > 0 \rightarrow a > 0 \Rightarrow R = [2, +\infty)$ ب) $\sqrt[3]{x + \frac{1}{x}} \rightarrow$ اعداد صحیح و منفی $\Rightarrow a > 0$ $a < 0 \Rightarrow (-\infty, -2] \cup [2, +\infty)$	۱۰