-1

$y = x^2 - 5$ زوج

$x^2 = y + 5 \rightarrow x = \pm\sqrt{y+5} \rightarrow y + 5 \geq 0 \rightarrow y \geq -5$

$[-5, +\infty)$

$y = x^3 + 1$ فرد

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

-2

$y = x^2 - 4x + 4$ زوج

$x^2 - 4x + 4$

$(x-2)^2 + 2 = y$

$(x-2)^2 = y - 2 \rightarrow x - 2 = \pm\sqrt{y-2}$

$x = \pm\sqrt{y-2} + 2 \rightarrow R_f = [2, +\infty)$

$y \geq 2$

$y = x^2 - \frac{5}{2}x + 1 + \frac{25}{16} - \frac{25}{16}$

$= \left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) \rightarrow (x - \frac{5}{4})^2$

$y = (x - \frac{5}{4})^2 + 1 - \frac{25}{16}$

$y - \frac{21}{16} = (x - \frac{5}{4})^2$

$\sqrt{y - \frac{21}{16}} = x - \frac{5}{4} \rightarrow \sqrt{y - \frac{21}{16}} - \frac{5}{4} = x$

$y \geq \frac{21}{16}$

$[\frac{21}{16}, +\infty)$

-3

$y = \frac{x^2 + 3}{x^2 - 2} \rightarrow yx^2 - 2y = x^2 + 3$

$yx^2 - x^2 = 2y + 3$

$x^2(y-1) = 2y + 3$

$x^2 = \frac{2y+3}{y-1} \leftarrow x = \pm\sqrt{\frac{2y+3}{y-1}}$

$y - 1 \geq 0 \rightarrow y \geq 1$

$[1, +\infty)$

ب) $y = \frac{2|x|+1}{|x|-4} \rightarrow y|x| - 4y = 2|x| + 1$

$y|x| - 2|x| = 4y + 1$

$|x|(y-2) = 4y+1$

$|x| = \frac{4y+1}{y-2} \geq 0$

$\frac{4y+1}{y-2} \geq 0$

	$-\frac{1}{4}$		2	
	+	−		+

$(2, +\infty) \cup (-\infty, -\frac{1}{4}]$

-4

$y = \frac{1}{x^2 - 4x}$

$yx^2 - 4xy = 1$

$yx^2 - 4xy - 1 = 0 \rightarrow \Delta = 16y^2 + 4y$

$\Delta = 4y(4y+1) \geq 0$

	$-\frac{1}{4}$		0	
	+	−		+

$R_f = (-\infty, -\frac{1}{4}] \cup [0, +\infty) - \{0\}$

-5

الف) $y = x^2 - 4x + 2 \rightarrow \min \rightarrow \begin{bmatrix} 2 \\ -2 \end{bmatrix}$

$[-2, +\infty)$

ب) $y = -x^2 + 4x + 2 \rightarrow \max \rightarrow [6]$

$\frac{-\Delta}{4a} \rightarrow \frac{-16 - 8}{-4} = 6$

$R_f = (-\infty, 6]$

6-

الف) $y=\sqrt{x^2-6x+2}$ $\quad \min\begin{cases} x=\frac{6}{2}=3 \\ y=\frac{-\Delta}{4a}=\frac{36-8}{} = \frac{-28}{4}=-7 \end{cases}$

x^2-6x+2

$a>0$ $\quad R_f=[0,+\infty)$

ب) $y=\sqrt{-x^2+4x+10}$

$\max\begin{cases} x=2 \\ y=16-(-40)=\frac{56}{4}=14 \end{cases}$

$\sqrt{(-\infty,+14]} \to [0,\sqrt{+14}]$

7-

الف) $y=x^7+3x^4+2x+1 \to$ بزرگترین توان فرد است $\to R_f=\mathbb{R}$

ب) $y=\sqrt{x^5+4x^2+6x+1}$

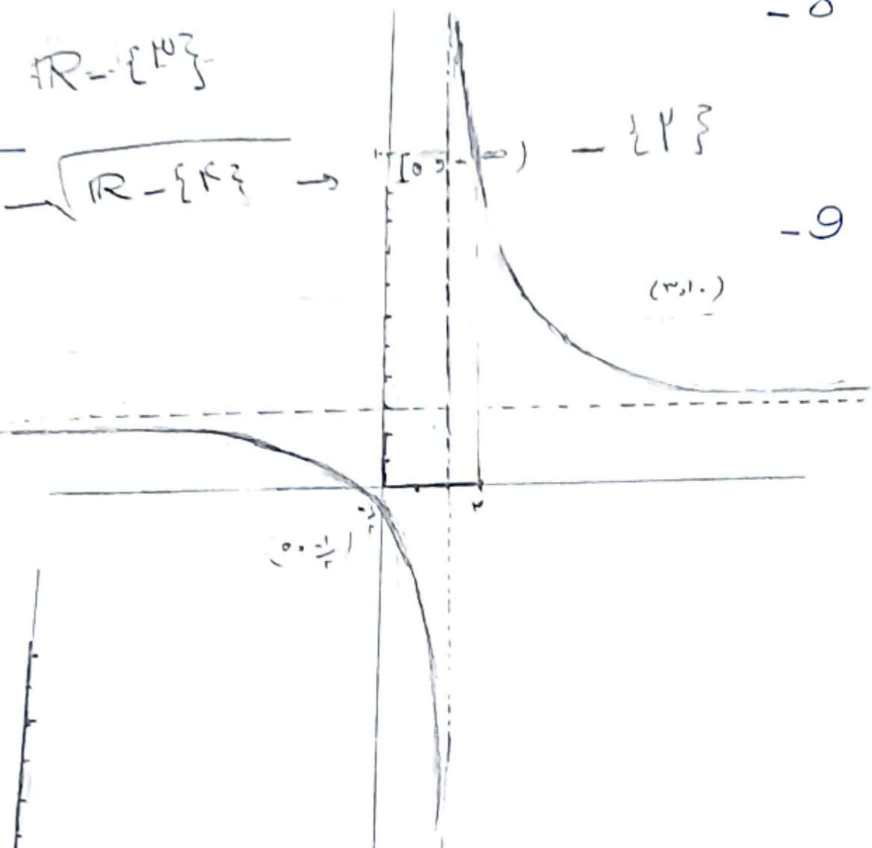
$\sqrt{\mathbb{R}}=\mathbb{R}^+=[0,+\infty)$

8-

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

ب) $y=\sqrt{\frac{4x+1}{x+3}}$ $\quad \sqrt{\mathbb{R}-\{4\}} \to [0,+\infty)-\{2\}$

9-

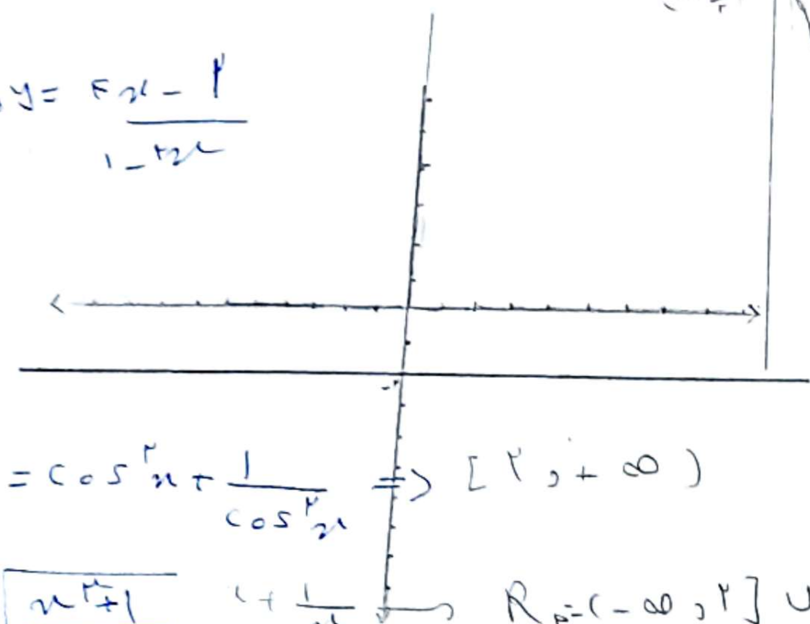


الف) $y=\frac{3x+1}{x-2}$

مجانب قائم $=2$

مجانب افقی $=3$

ب) $y=\frac{4x-2}{1-2x}$



10-

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

ب) $y=\sqrt[3]{\frac{x^2+1}{x}}$ $\quad x+\frac{1}{x} \to R_f=(-\infty,-2]\cup[2,+\infty)$