

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

ب) $yx^2 - 2y^2x - 1 = 0 \Rightarrow yx^2 - 2y^2x - 1 = 0 \Rightarrow 4y^2 + 4y \geq 0$

$\Rightarrow \frac{2y \pm \sqrt{4y^2 + 4y}}{2y}$
 $y \neq 0$

$R = (-\infty, -1] \cup (0, +\infty) \Leftarrow$

الف) $\frac{-b}{2a} = \frac{1}{2} \Rightarrow 1^2 - 1 + 1 = 1 \Rightarrow [1, +\infty)$

ب) $\frac{-b}{2a} = \frac{-9}{-1} = 9 \Rightarrow -9 + 18 + 3 = 12 \Rightarrow (-\infty, 12]$

ج) $\sqrt{R} \rightarrow \min = -\frac{(-1)}{1} = 1 \Rightarrow 1^2 - 1 - 3 = -1 \Rightarrow (-1, +\infty)$
 $[0, +\infty) \Leftarrow \checkmark$

د) $\sqrt{R} \rightarrow \frac{-b}{2a} = \frac{-1}{-1} = 1 \Rightarrow 1^2 - 1 = 0 \Rightarrow R = [0, 3]$
 $(-\infty, 9] \rightarrow$

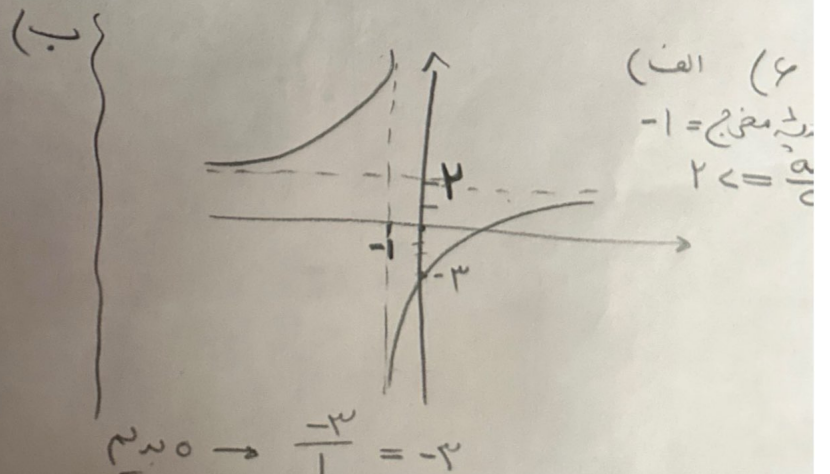
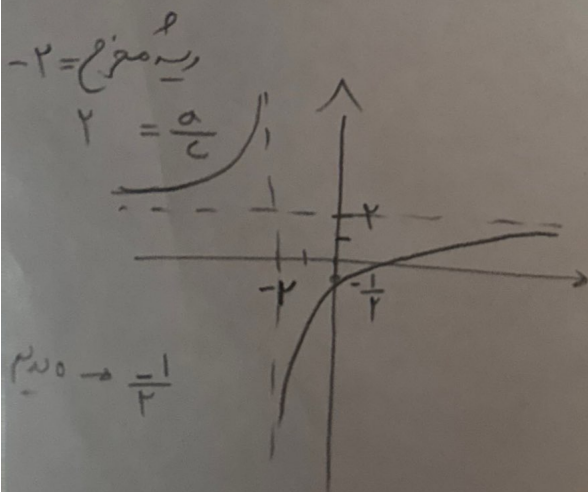
الف) R ب) R ج) $[0, +\infty)$ د) $[0, +\infty)$ (3)

ا) $R = \{3\}$ (4)

ب) $R = \{2\}$

الف) $R = \{2\} \Rightarrow [0, +\infty) - \{2\}$ (5)

ب) $R = \{-3\} \Rightarrow [0, +\infty)$



(الف) $-1 \leq \sin x \leq 1 \Rightarrow [2, +\infty) \cup (-\infty, -2]$ (٧)

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

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

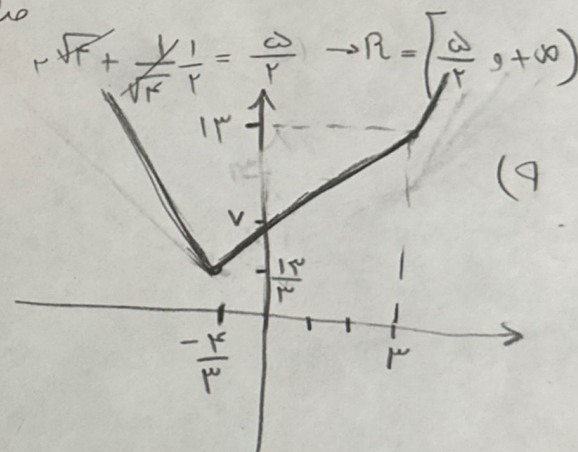
د) $\sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow [2, +\infty)$

الف) $x^2 + \frac{1}{x^2} + 3 - 3 \Rightarrow R = \left[\frac{1}{x^2}, +\infty \right) \Rightarrow R_T = \frac{1}{x^2} - 3 = \frac{1}{x^2} \quad (٨)$

ب) $\frac{x^2 + 4 + 1}{\sqrt{x^2 + 4}} = \sqrt{x^2 + 4} + \frac{1}{\sqrt{x^2 + 4}} \Rightarrow R = \left[\frac{5}{2}, +\infty \right)$

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

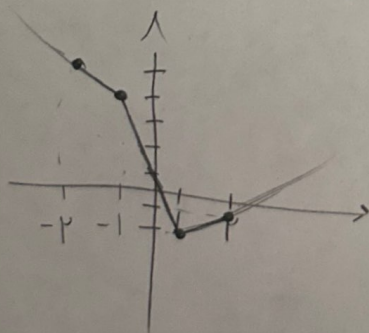
$x \geq 3 \Rightarrow 4x + 1$
 $-\frac{4}{3} \leq x \leq 3 \Rightarrow -x + 3 + 3x + 4 = 2x + 7$
 $-\frac{4}{3} > x \Rightarrow -x + 3 - 3x - 4 = -4x - 1$



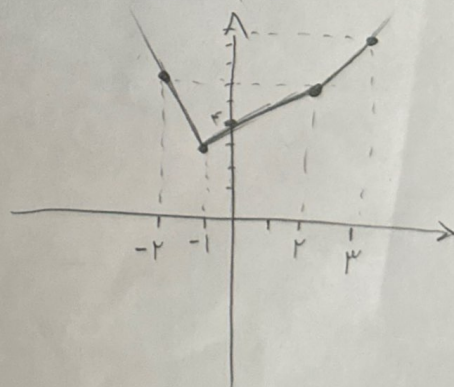
(١٥)
(الف)

ب)

$\begin{bmatrix} -2 \\ 5 \end{bmatrix} \begin{bmatrix} -1 \\ 4 \end{bmatrix} \begin{bmatrix} 1 \\ -2 \end{bmatrix} \begin{bmatrix} 2 \\ -1 \end{bmatrix} \left\{ \begin{bmatrix} -2 \\ 6 \end{bmatrix} \begin{bmatrix} -1 \\ 3 \end{bmatrix} \begin{bmatrix} 2 \\ 6 \end{bmatrix} \begin{bmatrix} 3 \\ 9 \end{bmatrix} \right.$



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



$R = [1, +\infty)$