

Subject:

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سوال 1

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

$$\text{ب) } y = x^3 + 1 \rightarrow x^3 = y - 1 \quad x = \sqrt[3]{y-1} \quad R_f = \mathbb{R}$$

$$\text{سوال 2) } y = x^2 - 2x + 2 \rightarrow x^2 - 2x + 2 = y \rightarrow (x-1)^2 + 1 = y \rightarrow (x-1)^2 = y-1$$

$$(x-1) = \pm \sqrt{y-1} \rightarrow x = \pm \sqrt{y-1} + 1 \rightarrow R_f = [1, +\infty)$$

$$\text{ج) } y = x^2 - 2x + 1 \rightarrow x^2 - 2x = y - 1 \rightarrow x(x-2) = y-1$$

$$\Delta \geq 0 \rightarrow -a^2 - 4ac \geq 0 \quad a x^2 + b x + c$$

$$x_1 + x_2 \geq 0 \quad -4y \geq 4 \quad y \leq -1 \rightarrow R_f = (-\infty, -1]$$

سوال 3

$$\text{الف) } y = \frac{x^2 + 3}{x^2 - 2} \rightarrow y x^2 - 2y = x^2 + 3 \rightarrow y x^2 - x^2 - 2y + 3 = 0 \rightarrow x^2(y-1) = 2y-3 \rightarrow x^2 = \frac{2y-3}{y-1}$$

$$\rightarrow x = \pm \sqrt{\frac{2y-3}{y-1}} \quad (-\infty, -\frac{3}{2}] \cup [1, +\infty)$$

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

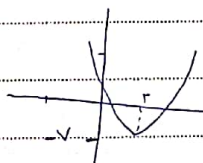
$$\rightarrow |x| = \frac{2y+1}{y-2} \rightarrow \frac{-1}{2} \leq \frac{2y+1}{y-2} \quad (-\infty, -\frac{1}{2}] \cup [2, +\infty)$$

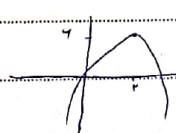
سوال 4

$$y = \frac{1}{x^2 - 4x} \rightarrow y x^2 - 4xy = 1 \quad y x^2 - 4xy - 1 = 0 \rightarrow (x-2y)^2 - 4(y-1) \geq 0$$

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

سوال 5

$$\text{الف) } y = x^2 - 4x + 2 \rightarrow \begin{cases} \text{ext min} & -\frac{b}{2a} = \frac{4}{2} = 2 \\ & 4 - 16 + 2 = -10 \end{cases} \quad R_f = [-10, +\infty)$$


$$\text{ب) } y = -x^2 + 4x + 2 \rightarrow \begin{cases} \text{ext max} & -\frac{b}{2a} = \frac{-4}{-2} = 2 \\ & -4 + 16 + 2 = 14 \end{cases} \quad R_f = (-\infty, 14]$$


سوال 6

$$\text{الف) } y = \sqrt{x^2 - 4x + 2} \rightarrow \begin{cases} \text{ext min} & -\frac{b}{2a} = 2 \\ & -10 \end{cases} \Rightarrow \sqrt{[-10, +\infty)} \Rightarrow R_f = [0, +\infty)$$

$$\text{ب) } y = \sqrt{-x^2 + 4x + 1} \rightarrow \begin{cases} \text{ext max} & -\frac{b}{2a} = 2 \\ & 14 \end{cases} \Rightarrow \sqrt{(-\infty, 14]} \Rightarrow (0, \sqrt{14}]$$

Arman

الف) $y = x^3 + 3x^2 + 2x + 1 \rightarrow \mathbb{R}^3 \rightarrow \mathbb{R}$

سوال ٧

ب) $y = \int x^3 + 3x^2 + 2x + 1 \rightarrow \mathbb{R}^4 \rightarrow \mathbb{R}$

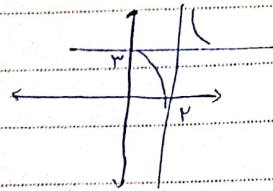
سوال ٨

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

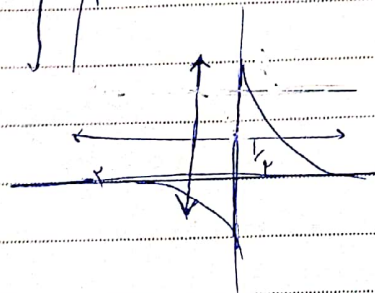
ب) $y = \sqrt{\frac{2x+1}{x+3}} \rightarrow \frac{a}{c} = \sqrt{2} \rightarrow \mathbb{R} \rightarrow [0, +\infty) - \{2\}$

سوال ٩

الف) $y = \frac{3x+1}{x-2} \rightarrow$
 - جانبية = 2
 - افقية = 3



ب) $y = \frac{4x-2}{1-2x} \rightarrow$
 - جانبية = 1/2
 - افقية = 2



سوال ١٠

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

ب) $y = \sqrt{\frac{x^2+1}{x}} \rightarrow \sqrt{\frac{x}{x} + \frac{1}{x}} \Rightarrow \mathbb{R} \rightarrow \mathbb{R}^+$

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Arman