

Subject:

Year:

Month:

Day:

page: ()

12

سوال 1

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

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

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$$الف) y = x^2 - 2x + 2 \rightarrow x^2 - 2x + 2 = y \rightarrow (x-1)^2 + 1 = y \rightarrow (x-1)^2 = y-1$$

سوال 2

$$(x-1)^2 = y-1 \rightarrow x = \pm \sqrt{y-1} + 1 \rightarrow R_f = [1, +\infty)$$

2

$$ب) y = x^2 - 2x + 1 \rightarrow x^2 - 2x = y - 1 \rightarrow x(x-2) = y-1$$

$$\Delta \geq 0 \rightarrow -a^2 - 4ac \geq 0 \quad a x^2 + b x + c \quad x_1 + x_2 \geq 0 \quad -4y \geq 4 \quad y \leq -1 \rightarrow R_f = (-\infty, -1]$$

سوال 3

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

$$\frac{2y-3}{y-1} \geq 0 \rightarrow (-\infty, -\frac{3}{2}] \cup [1, +\infty)$$

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

$$\frac{2y+1}{y-2} \geq 0 \rightarrow (-\infty, -\frac{1}{2}] \cup [2, +\infty)$$

سوال 4

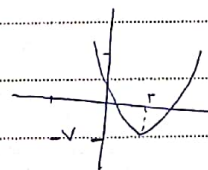
$$y = \frac{1}{x^2 - 4x} \rightarrow y x^2 - 4xy = 1 \quad y x^2 - 4xy - 1 = 0 \rightarrow (x-2y)^2 - 4(y-1) \geq 0$$

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

سوال 5

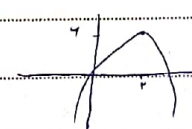
$$الف) y = x^2 - 4x + 2 \rightarrow \begin{cases} \text{ext min} & -\frac{b}{2a} = \frac{4}{2} = 2 \\ & 4 - 16 + 2 = -10 \end{cases}$$



$$R_f = [-10, +\infty)$$

25

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



$$R_f = (-\infty, 14]$$

سوال 6

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

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

Arman

الف) $y = x^3 + 3x^2 + 2x + 1 \rightarrow Rf = IR$

مسألة ٧

(٧)

ب) $y = \int x^3 + 3x^2 + 2x + 1 \rightarrow Rf = (0, +\infty)$

مسألة ٨

(٨)

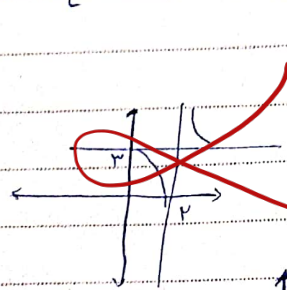
الف) $y = \frac{3x+1}{x-2} \rightarrow \frac{a}{c} = 3 \rightarrow Rf = IR - \{2\}$

ب) $y = \sqrt{\frac{3x+1}{x+3}} \rightarrow \frac{a}{c} = \sqrt{4} = 2 \rightarrow Rf = [0, +\infty) - \{2\}$

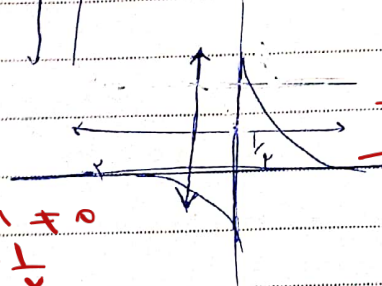
مسألة ٩

(٩)

الف) $y = \frac{3x+1}{x-2} \rightarrow$
 - د. جانبية: ٢
 - د. افقية: ٣



ب) $y = \frac{4x-2}{1-2x} \rightarrow$
 - د. جانبية: ١/٢
 - د. افقية: -٢



ج) $y = \frac{2(2x-1)}{-(2x-1)} = -2$ (لأن $2x-1 \neq 0$)
 $x \neq \frac{1}{2}$

مسألة ١٠

(١٠)

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

ب) $y = \sqrt{\frac{x^2+1}{x}} \rightarrow \sqrt{\frac{x}{x} + \frac{1}{x}} \Rightarrow IR - Rf$
 $x > 0 \rightarrow (\sqrt{x}, +\infty)$
 $x < 0 \rightarrow (-\infty, \sqrt{-x})$

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