

الف) $y = x^2 - 5$ $y + 5 = x^2 \pm \sqrt{y+5} = x$ $y+5 \geq 0$ $y \geq -5$ $R_f = [-5, +\infty)$ (1)

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

الف) $y = x^2 - 4x + 4 = x^2 - 4x + 4 + 2 = (x-2)^2 + 2$ $y - 2 = (x-2)^2 \pm \sqrt{y-2} = x$ $y-2 \geq 0$ $y \geq 2$ $R_f = [2, +\infty)$ (2)

ب) $y = x^2 - 5x + 1$ $x^2 - 5x + 1 - y = 0 \Rightarrow \Delta \geq 0$ $\Delta = (-5)^2 - 4(1-y) \Rightarrow 25 - 4 + 4y \geq 0$ $y \geq -5/4$ $R_f = [-5/4, +\infty)$ (2)

الف) $y = \frac{x^2+3}{x^2-2}$ $yx^2 - 2y = x^2 + 3$ $yx^2 - x^2 = 2y + 3$ $x^2 = \frac{2y+3}{y-1}$ $x = \pm \sqrt{\frac{2y+3}{y-1}}$ $R_f = (-\infty, -1/5] \cup (1, +\infty) \setminus \mathbb{R} - (-1/5, 1]$ (3)

ب) $y = \frac{x|x|+1}{|x|-4}$ $y|x|-4y = x|x|+1$ $y|x|-x|x| = 4y+1$ $|x|(y-1) = 4y+1$ $|x| = \frac{4y+1}{y-1}$ $R_f = (-\infty, -1/4] \cup (1, +\infty) \setminus \mathbb{R} - (-1/4, 1]$ (2)

$y = \frac{1}{x^2+2x}$ $yx^2 - 4xy = 1$ $yx^2 - 4xy - 1 = 0 \Rightarrow \Delta \geq 0$ $\Delta = (-4y)^2 - 4(-y) = 16y^2 + 4y \geq 0$ $4y(4y+1) \geq 0$ $y \geq 0$ $R_f = \mathbb{R} - (-1/4, 0)$ (2)

الف) $y = x^2 - 4x + 2$ $\frac{-b}{2a} = x = \frac{4}{2} = 2$ $y = 4 - 16 + 2 = -10$ $a > 0 \rightarrow \min |_{x=2} = -10$ $R_f = [-10, +\infty)$ (2)

ب) $y = x^2 + 4x + 2$ $\frac{-b}{2a} = x = \frac{-4}{2} = -2$ $a < 0 \rightarrow \max |_{x=-2} = 10$ $R_f = (-\infty, 10]$ (2)

الف) $y = \sqrt{x^2 - 9x + 2}$ $\frac{-b}{2a} = x = \frac{9}{2} = 4.5$ $\min |_{x=4.5} = \sqrt{(-4.5)^2 - 9(4.5) + 2} = \sqrt{20.25 - 40.5 + 2} = \sqrt{-18.25}$ $a > 0 \rightarrow \min$ $R_f = [0, +\infty)$ (2)

ب) $y = \sqrt{-x^2 + 4x + 10}$ $\frac{-b}{2a} = x = \frac{-4}{-2} = 2$ $\max |_{x=2} = \sqrt{-2^2 + 4(2) + 10} = \sqrt{10}$ $a < 0 \rightarrow \max$ $R_f = [0, \sqrt{10}]$ (2)

الف) $x^5 + 2x^4 + 2x + 1$ $R_f = \mathbb{R}$ (5)

ب) $\sqrt{x^5 + 2x^4 + 2x + 1}$ $R_f = [0, +\infty)$ (2)

$$الف) y = \frac{x^2 + 1}{x - 2}$$

$$R_f = \mathbb{R} - \{2\} \quad \checkmark$$

1

$$ب) y = \sqrt{\frac{x+1}{x+3}}$$

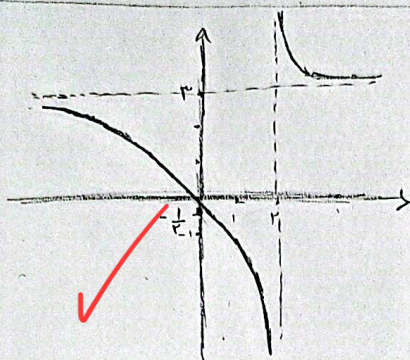
$$R_f = [0, +\infty) - \{2\} \quad \checkmark$$

2

$$الف) y = \frac{x^2 + 1}{x - 2}$$

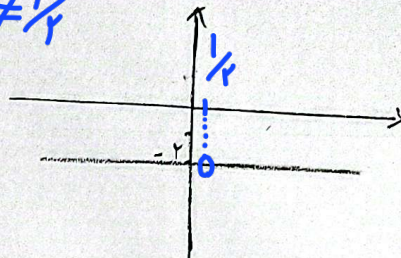
مجاہد مقام: 2
مجاہد انقی: 3

$$عرض از منظر: $z = \frac{0+1}{-2} = -\frac{1}{2}$$$



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

$$x \neq \frac{1}{2}$$



9

100

$$الف) y = \cos^2 x + \frac{1}{\cos^2 x}$$

$$R_f = [2, +\infty) \quad \checkmark$$

10

$$ب) y = \sqrt[3]{\frac{x^2 + 1}{x}} = \sqrt[3]{\frac{x}{x} + \frac{1}{x}}$$

$$R_f = (-\infty, \sqrt[3]{-1}] \cup [\sqrt[3]{1}, +\infty)$$

$$[2, +\infty) \leftarrow x > 0$$

$$(-\infty, -2] \leftarrow x < 0$$

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