

الف) $y = x^2 - 5$ $y + 5 = x^2 \pm \sqrt{y+5} = x$ $y+5 \geq 0$ $y \geq -5$ $R_f = [-5, +\infty)$ (۱)

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

الف) $y = x^2 - 4x + 4 = x^2 - 4x + 4 + 2 = (x-2)^2 + 2$ $y - 2 = (x-2)^2 \pm \sqrt{y-2} = x$ $y-2 \geq 0$ $y \geq 2$ $R_f = [2, +\infty)$ (۲)

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

الف) $y = \frac{x^2+3}{x^2-2}$ $y(x^2-2) = x^2+3$ $yx^2 - x^2 = xy+3$ $x^2 = \frac{xy+3}{y-1}$ $x = \pm \sqrt{\frac{xy+3}{y-1}}$ $\frac{-1/5}{+1} - \frac{1}{-1} +$ $R_f = (-\infty, -1/5] \cup (1, +\infty) \subset \mathbb{R} - (-1/5, 1]$ (۳)

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

$y = \frac{1}{x^2+2x}$ $yx^2 - 4xy = 1$ $yx^2 - 4xy - 1 = 0 \Rightarrow \Delta \geq 0$ (۴)
 $\Delta = (-4y)^2 - 4(-y) = 16y^2 + 4y \geq 0$ $4y(4y+1) \geq 0$ $\frac{-1/4}{+1} - \frac{0}{-1} +$
 $\Rightarrow y \in \mathbb{R} - (-1/4, 0) \Rightarrow \mathbb{R} = \mathbb{R} - (-1/4, 0)$

الف) $y = x^2 - 4x + 2$ $\frac{-b}{2a} = x = \frac{4}{2} = 2$ $y = 4 - 16 + 2 = -10$ $a > 0 \rightarrow \min \left| \frac{r}{-v} \right| \Rightarrow R_f = [-10, +\infty)$ (۵)

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

الف) $y = \sqrt{x^2 - 9x + 2}$ $\frac{-b}{2a} = x = \frac{9}{2} = 4.5$ $\min \left| \frac{r}{-v} \right| \sqrt{[-10, +\infty)}$ $a > 0$ (۶)

ب) $y = \sqrt{-x^2 + 4x + 10}$ $\frac{-b}{2a} = x = \frac{-4}{-2} = 2$ $\max \left| \frac{r}{v} \right|$ $R_f = [0, \sqrt{14}]$ $a < 0$

الف) $x^5 + 2x^4 + 2x + 1$ $R_f = \mathbb{R}$ (۷)

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

$$الف) y = \frac{x^2 + 1}{x - 2}$$

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

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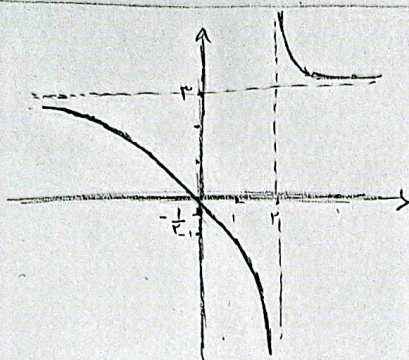
$$ب) y = \sqrt{\frac{x+1}{x+3}}$$

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

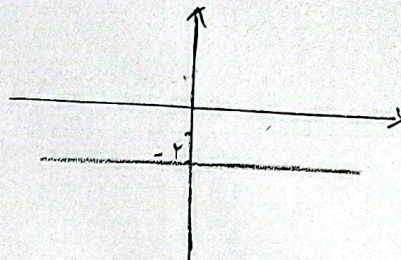
$$الف) y = \frac{x^2 + 1}{x - 2}$$

مجاہد قائم
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$$عرض از منظر = \frac{0+1}{-2} = -\frac{1}{2}$$



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



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

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

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

$$R_f = (-\infty, \sqrt[3]{-2}] \cup [\sqrt[3]{2}, +\infty)$$

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

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