

$$y = x^2 - 5 \Rightarrow y + 5 = x^2 \quad (\text{الف})$$

$$\Rightarrow x = \sqrt{y+5} \Rightarrow R = [-5, \infty)$$

$$y = x^2 + 1 \Rightarrow y - 1 = x^2 \Rightarrow \sqrt{y-1} = x \quad (\text{ب})$$

$$\Rightarrow R = \mathbb{R}$$

$$y = x^2 - 4x + 4 \Rightarrow y = x^2 - 4x + 4 + 1 \Rightarrow y = (x-2)^2 + 1 \quad (\text{الف})$$

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

$$y = 2x^2 - 5x + 1 \Rightarrow x^2 - \frac{5}{2}x + \frac{1}{2} = \frac{y}{2} \Rightarrow x^2 - \frac{5}{2}x + \frac{1}{2} - \frac{y}{2} = 0$$

$$\Rightarrow (x - \frac{5}{4})^2 - \frac{25}{16} + \frac{1}{2} - \frac{y}{2} = 0 \Rightarrow (x - \frac{5}{4})^2 = \frac{y}{2} + \frac{9}{16}$$

$$\Rightarrow (x - \frac{5}{4})^2 = \frac{y + \frac{9}{8}}{2} \Rightarrow \pm \sqrt{\frac{y + \frac{9}{8}}{2}} + \frac{5}{4} = x \Rightarrow R = [-\frac{5}{4}, +\infty)$$

$$y = \frac{x^2 + 3}{x^2 - 1} = yx^2 - y = x^2 + 3 \Rightarrow yx^2 - x^2 = y + 3 \Rightarrow x^2(y-1) = y+3 \quad (\text{الف})$$

$$\Rightarrow x^2 = \frac{y+3}{y-1} \Rightarrow x = \pm \sqrt{\frac{y+3}{y-1}} \Rightarrow R = (1, +\infty)$$

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

$$\Rightarrow |x| = \frac{y+2}{y-2} \Rightarrow R = (2, +\infty)$$

$$x^2 - \varepsilon x = (x-1)^2 - \varepsilon \Rightarrow y = \frac{1}{(x-1)^2 - \varepsilon}$$

$$x^2 - \varepsilon x = 0 \Rightarrow x(x-\varepsilon) = 0$$

$$\Rightarrow x \neq 0, x \neq \varepsilon$$

$$\Rightarrow (x-1)^2 = t \Rightarrow y = \frac{1}{t-\varepsilon} \Rightarrow \begin{cases} 0 \leq t < \varepsilon \Rightarrow t-\varepsilon < 0 \Rightarrow y = \frac{1}{\text{موجب}} < 0 \Rightarrow y = -\frac{1}{\varepsilon} \Rightarrow y \rightarrow -\infty \\ \varepsilon < t \Rightarrow t-\varepsilon > 0 \Rightarrow y = \frac{1}{\text{موجب}} > 0 \Rightarrow y = \frac{1}{t-\varepsilon} \Rightarrow y \rightarrow +\infty \end{cases}$$

$$\Rightarrow R = (-\infty, -\frac{1}{\varepsilon}] \cup (0, +\infty)$$

$$y = x^2 - 4x + 4 \Rightarrow \min \left\{ \begin{array}{l} x_{\min} = \frac{-b}{2a} = 2 \\ y_{\min} = -4 \end{array} \right\} \quad (\text{الف})$$

$$y = -x^2 + 4x + 4 \Rightarrow \max \left\{ \begin{array}{l} x_{\max} = 2 \\ y_{\max} = 8 \end{array} \right\} \quad (\text{ب})$$

$$y = \sqrt{x^2 - 5x + 4} \Rightarrow \min \Big|_{-\infty}^{\infty} \Rightarrow R = \sqrt{[-4, +\infty)} \Rightarrow R = [0, +\infty) \text{ (الف)}$$

$$y = \sqrt{-x^2 + 4x + 10} \Rightarrow \max \Big|_{-\infty}^{\infty} \Rightarrow R = \sqrt{(-\infty, 14]} \Rightarrow R = [0, 14] \text{ (ب)}$$

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$$R_f = \mathbb{R}$$

(الف)

$$R_f = R^+ + \{0\} \Rightarrow [0, +\infty)$$

ب

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$$\frac{x+1}{x-2} \Rightarrow R = \left\{ \frac{3}{1} \right\}$$

(الف)

$$y = \sqrt{\frac{x+1}{x+3}} \Rightarrow R_f = [0, +\infty) - \left\{ \frac{1}{2} \right\} \text{ (ب)}$$

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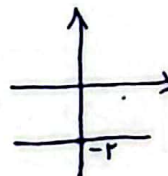
$$y = \frac{x+1}{x-2}$$



(الف)

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$$y = \frac{x-2}{1-x}$$



(ب)

$$y = \cos^2 x + \frac{1}{\cos^2 x} \Rightarrow R_f = [2, +\infty) \text{ (الف)}$$

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

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