

$$f(x) \rightarrow \sqrt{x+4}\sqrt{x-4} \rightarrow \sqrt{(\sqrt{x-4}+2)^2} \xrightarrow{x \geq 4} \sqrt{x-4}+2$$

$$g(x) \rightarrow \sqrt{x-4}\sqrt{x-4} \rightarrow \sqrt{(\sqrt{x-4}-2)^2} \xrightarrow{x \geq 4} \sqrt{x-4}-2$$

$$f(x) + g(x) = a + b\sqrt{x+c} \rightarrow 2\sqrt{x-4} \rightarrow \begin{matrix} c = -4 \\ b = 2 \\ a = 0 \end{matrix} \rightarrow \frac{a+b}{c} = -\frac{1}{4}$$

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$$g(x) = \{(2, 1), (1, 0), (3, 4), (0, 4)\}$$

$$f(x) = \{(2, -4), (1, x), (3, x), (0, \frac{x}{2})\}$$

$$\frac{g}{f} = \{(2, -\frac{1}{4}), (0, 4)\}$$

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$$الف) f(2x) \rightarrow \{(\frac{1}{2}, 2), (\frac{3}{2}, -1), (2, 2), (\frac{5}{2}, 4)\}$$

$$ب) f(x^2) \rightarrow \{(1, 2), (-1, 2), (\sqrt{3}, -1), (-\sqrt{3}, -1), (2, 2), (-2, 2)\}$$

$$ج) 2g^2(x)+1 \rightarrow \{(-2, 19), (1, 3), (3, 1), (-1, 1)\}$$

$$د) \frac{2f}{g} \rightarrow \{(1, -4), (-1, x), (3, -1)\}$$

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$$h = 2f + g \rightarrow \{(2, 4), (3, 4), (-2, 4)\}$$

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$$۱) f(x) = \frac{\sqrt{3x-x}}{x-2} \rightarrow$$

$$۱) 3x \geq 0 \rightarrow x \geq 0$$

$$۲) \sqrt{3x-x} \geq x \rightarrow 3x \geq x^2 \rightarrow x(x-3) \leq 0 \rightarrow \frac{0}{x-3} \rightarrow x \in [0, 3]$$

$$۳) x \neq 2$$

$$۴) D\left[\frac{f}{g}\right](x) \rightarrow x \in \{0, 1, 3\}$$

$$Df \rightarrow [1, 3] - \{2\}$$

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$$۲) g(x) = [x] \cdot [-x] \rightarrow g(x) \neq 1 \rightarrow [x] + [-x] \neq 0 \quad x \in \mathbb{Z}$$

$$Dg \rightarrow \mathbb{R}$$

$$h(x) = \frac{f(x)}{g(x)} \rightarrow \{(1, 0), (2, \frac{1}{\sqrt{2}}), (4, 0)\}$$

$$f(x) \rightarrow \{(1, 0), (2, \sqrt{2}), (4, 0), (a, x)\}$$

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

$$y = x^2 - 2x + 1 + 1$$

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

$$y = \frac{1}{(x-1)^2 - 1} \rightarrow y'((x-1)^2 - 1) = 1$$

$$x = \sqrt{y-1} + 1 \rightarrow \boxed{Ry = \mathbb{R}}$$

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

$$x = \sqrt{\frac{y+1}{y}} + 1$$

$$Ry = [-\infty, -1] \cup [0, +\infty]$$

$$\text{أ) } y = x^2 - 4x + 10$$

$$\begin{matrix} x_{\min} \rightarrow 2 \\ y_{\min} \rightarrow 6 \end{matrix}$$

$$R \rightarrow [6, +\infty]$$

$$\text{ب) } y = -x^2 + 4x + 3$$

$$\begin{matrix} x_{\min} \rightarrow 2 \\ y_{\min} \rightarrow 7 \end{matrix}$$

$$R \rightarrow [-\infty, 7]$$

$$\text{ج) } y = \sqrt{x^2 - 4x - 3}$$

$$\begin{matrix} x_{\min} \rightarrow 2 \\ y_{\min} \rightarrow -3 \end{matrix}$$

$$R \rightarrow [-3, +\infty]$$

$$\text{د) } y = \sqrt{4x - x^2}$$

$$\begin{matrix} x_{\min} \rightarrow 2 \\ y_{\min} \rightarrow 2 \end{matrix}$$

$$R \rightarrow [2, 2]$$

$$\text{أ) } R \in \mathbb{R}$$

$$\text{ب) } R \in \mathbb{R}$$

$$\text{ج) } R \in [0, +\infty]$$

$$\text{د) } R \in [0, +\infty]$$

$$\text{أ) } y = \frac{x+1}{x-2}$$

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

$$\text{ب) } y = \frac{x-1}{x+1}$$

$$Ry = \mathbb{R} - \{1\}$$