

$$f(x) = \sqrt{x + \varepsilon \sqrt{x - \varepsilon}} \leadsto \sqrt{(\sqrt{x - \varepsilon} + 1)^2} \Rightarrow \sqrt{x - \varepsilon} + 1$$

$$g(x) = \sqrt{x - \varepsilon \sqrt{x - \varepsilon}} \leadsto \sqrt{(\sqrt{x - \varepsilon} - 1)^2} \Rightarrow \sqrt{x - \varepsilon} - 1$$

$$\sqrt{x - \varepsilon} + 1 + \sqrt{x - \varepsilon} - 1 = a + b\sqrt{x + c}$$

$$2\sqrt{x - \varepsilon} = a + b\sqrt{x + c} \Rightarrow a = 0 \quad b = 2 \quad c = -\varepsilon \Rightarrow \frac{0 + 2}{-\varepsilon} = -\frac{2}{\varepsilon}$$

$$x^2 - \varepsilon x + 1 = 0 \Rightarrow \begin{cases} x = 1 \\ x = \varepsilon \end{cases}$$

$$\text{Dgnf} = \{1, 0\}$$

$$g(0) = \varepsilon \quad f(0) = \frac{1}{\varepsilon}$$

$$\varepsilon \times \frac{1}{\varepsilon} \Rightarrow 1 \rightarrow (0, 1)$$

$$g(\varepsilon) = 1 \quad f(\varepsilon) = -\varepsilon$$

$$1 \times -\varepsilon \Rightarrow -\varepsilon \rightarrow (\varepsilon, -\varepsilon)$$

$$\{(0, 1), (\varepsilon, -\varepsilon)\}$$

$$\text{Dgnf} = \{-1, 2, 1\}$$

$$1) \left\{ \left(\frac{1}{\varepsilon}, 2 \right), (1, 5), (-1, 2), \left(-\frac{1}{\varepsilon}, 2 \right) \right\}$$

$$2) \left\{ \left(\frac{1}{\varepsilon}, 2 \right), \left(\frac{1}{\varepsilon}, 3 \right), (-1, 2), \left(-\frac{1}{\varepsilon}, 2 \right) \right\}$$

$$3) \left\{ (-2, 1), (1, 3), (3, 9), (-1, 1) \right\}$$

$$4) \left\{ \left(\frac{1}{\varepsilon}, \frac{1}{\varepsilon} \right), (3, -1), (1, -\varepsilon) \right\}$$

$$\text{Dgnf} = \{2, 3, -2\}$$

$$\text{حاصل} = \{(2, 5), (3, 5), (-2, 1)\}$$

$$D_F \Rightarrow [0, 3] - \{1\} \quad D_F \cap D_g = [0, 3] - \{1\}$$

$$D_g = \mathbb{R}$$

$$\left(\frac{f}{g} \right)(x) \leadsto \begin{aligned} [x] + [-x] + 1 &= 0 \\ [x] + [-x] &= -1 \end{aligned} \leadsto D \rightarrow \{x \mid x \in \mathbb{Z}, 0 < x < 3, x \neq 1\} \Rightarrow D_f = \{0, 1, 2\}$$

$$Df = \sqrt{4x - x^2 - 2} \rightarrow Df = [1, 2] \Rightarrow Dg \cap Df = \{1, 2, 2\}$$

$$h(x) = \{(1,0), (2,0), (2,1)\}$$

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$$\text{ا) } x^3 - 3x^2 + 3x - 1 + 1 \Rightarrow (x-1)(x^2 + x + 1) - 3x(x-1) + 1 = (x-1)(x^2 + x + 1 - 3x + 3) + 1 = (x-1)(x^2 - 2x + 4) + 1$$

$$y-1 = (x-1)^3 \Rightarrow x-1 = \sqrt[3]{y-1} + 1 \Rightarrow R_f = \mathbb{R}$$

$$\text{ب) } yx^2 - 2xy = 1 \Rightarrow yx^2 - 2xy - 1 = 0 \quad \Delta = 2y^2 + 4y \Rightarrow -2y = \sqrt{2y^2 + 4y} \neq 0$$

$$2y^2 + 4y \geq 0 \Rightarrow y \geq 0 \Rightarrow (-\infty, -1] \cup (0, \infty) = R_f$$

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$$\text{ا) } x_{\min} = -\frac{b}{2a} = 1 \quad y = 0 \quad R_f = [1, \infty)$$

$$\text{ب) } x_{\min} = -\frac{b}{2a} = 3 \quad y = 12 \quad R = (-\infty, 12]$$

$$\text{ج) } x_{\min} = -\frac{b}{2a} = 1 \quad y = -7 \quad R = [0, \infty)$$

$$\text{د) } x_{\min} = 3 \quad y = 4 \quad R = [0, 3]$$

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$$\text{ا) } \mathbb{R}$$

$$\text{ب) } \mathbb{R}$$

$$\text{ج) } [0, \infty)$$

$$\text{د) } [0, \infty)$$

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$$\text{ا) } \mathbb{R} - \left\{\frac{1}{2}\right\} \Rightarrow \mathbb{R} - \{2\}$$

$$\text{ب) } \mathbb{R} - \left\{\frac{1}{2}\right\} \Rightarrow \mathbb{R} - \{2\}$$

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