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$$t = \sqrt{x-4}$$

$$f(x) = \sqrt{t^2 + 4 + t^2 + 4} = t + 2$$

$$g(x) = \sqrt{t^2 - 4 + t^2 + 4} = t - 2$$

$$\Rightarrow f+g = t + t = 2\sqrt{x-4}$$

$$a=0$$

$$b=-2$$

$$c=-4$$

$$\frac{a+b}{c} = \frac{-1}{-2}$$

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$$f(x) = -x$$

$$f(x) \rightarrow D_f = \mathbb{R} - \{1, 3\}$$

$$f(0) = \frac{x}{x}$$

$$\frac{g(x)}{f(x)} = -\frac{1}{x}$$

$$\frac{g(0)}{f(0)} = \frac{f}{\frac{x}{x}} = 4$$

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

دقت! ارفاق

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$$f(x) = \left\{ \left( \frac{1}{x}, 2 \right), \left( \frac{x}{2}, -1 \right), \left( x, \frac{1}{x} \right), \left( \frac{1}{x}, 2 \right) \right\}$$

$$f(x) = \left\{ \left( \frac{1}{2}, 2 \right), \left( \frac{1}{2}, 2 \right), \left( -\sqrt{2}, -1 \right), \left( \sqrt{2}, -1 \right), \left( -\sqrt{2}, 2 \right), \left( \sqrt{2}, 2 \right) \right\}$$

$$g(x) + 1 = \left\{ \left( -2, 9 \right), \left( \frac{1}{2}, 3 \right), \left( 3, \frac{1}{3} \right), \left( -2, 9 \right) \right\}$$

$$\frac{xf}{g} = \left\{ \left( \frac{1}{2}, -4 \right), \left( 3, -1 \right) \right\}$$

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$$h(x) = x + 3 = 5$$

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$$h(-x) = x(0) + 2 = 4$$

$$h = \left\{ (x, 5), (3, 5), (-2, 5) \right\}$$

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$$\sqrt{x}x - x \geq 0 \rightarrow 0 \leq x \leq 3$$

$$x \neq 2 \rightarrow \text{مخرج صفر}$$

$$g \neq -1 \rightarrow \text{مخرج صفر}$$

$$x \geq 0 \rightarrow x \geq 0$$

$$g(x) = [x] + [-x]$$

$$x \in \mathbb{Z} \rightarrow g(x) = 0$$

$$x \notin \mathbb{Z} \rightarrow g(x) = -1$$

$$\left( \frac{f}{g+1} \right)(x) = [0, 3] - \{2\} = \{0, 1, 3\}$$

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$$f(x) = \{(1,0), (2, \sqrt{2}), (4,0), (\frac{5}{2}, \frac{5}{2})\}$$

$$f(x) = -(x^2 - \Delta x + \epsilon) \geq 0$$

$$-(x - \epsilon)(x - 1) \geq 0$$

$$h(x) = \{(1,0), (2, \frac{\sqrt{2}}{2}), (\frac{5}{2}, 0)\}$$

$$\frac{x}{y} - \frac{1}{\delta} + \frac{\epsilon}{\delta} - \rightarrow x \neq \delta$$

$$\text{ا) } y = x^3 - 2x^2 + 3x$$

$$y = (x-1)^3 + 1$$

$$y-1 = (x-1)^3$$

$$x = \sqrt[3]{y-1} + 1$$

$$R_f = \mathbb{R}$$

$$\text{ب) } yx^2 - 2yx = 1$$

$$R_f = (-\infty, -1] \cup (0, +\infty)$$

$$yx^2 - 2yx - 1 = 0$$

$$x = \frac{2y \pm \sqrt{(-2y)^2 + 4y}}{2y}$$

$$y^2 + y \geq 0 \rightarrow y \leq -1 \vee y \geq 0 \quad [y \neq 0]$$

$$\text{ا) } S \mid \begin{matrix} x = \frac{f}{x} = 2 \\ y = 4 \end{matrix}$$

$$R_f = [4, +\infty)$$

$$\text{ب) } S \mid \begin{matrix} x = \frac{-f}{x} = 3 \\ y = 4(3) - 9 = 9 \end{matrix}$$

$$R_f = [0, \sqrt{9}]$$

$$[1, \sqrt{9}]$$

$$\text{ج) } S \mid \begin{matrix} x = \frac{-f}{x} = 3 \\ y = 12 \end{matrix}$$

$$R_f = (-\infty, 12]$$

$$\text{د) } S \mid \begin{matrix} x = \frac{f}{x} = 2 \\ y = -4 \end{matrix}$$

$$y \geq 0 \quad R_f = [0, +\infty)$$

$$\text{ا) } R_f = \mathbb{R}$$

$$\text{ب) } R_f = [0, +\infty)$$

$$\text{ج) } R_f = \mathbb{R}$$

$$\text{د) } R_f = [0, +\infty)$$

$$\text{ا) } R_f = \mathbb{R} - \{3\}$$

$$\text{ب) } R_f = \mathbb{R} - \{2\}$$

$$\text{الف - ١)} \quad y = x^2 - 2x + 1 \rightarrow \min \left| \begin{array}{l} x = \frac{2}{2} = 1 \\ y = 1 - 2 + 1 = 0 \end{array} \right. \rightarrow R_f = [0, +\infty)$$

$$\text{ب - ١)} \quad y = -x^2 + 4x + 3 \rightarrow \max \left| \begin{array}{l} x = \frac{-4}{-2} = 2 \\ y = -9 + 12 + 3 = 6 \end{array} \right. \rightarrow R_f = (-\infty, 6]$$

$$\text{ج - ١)} \quad y = x^2 - 2x - 3 \rightarrow \min \left| \begin{array}{l} x = \frac{2}{2} = 1 \\ y = 1 - 2 - 3 = -4 \end{array} \right. \rightarrow R_f = \sqrt{[-4, +\infty)} = [-2, +\infty)$$

$$\text{د - ١)} \quad y = 4x - x^2 \rightarrow \max \left| \begin{array}{l} x = \frac{-4}{-2} = 2 \\ y = 12 - 4 = 8 \end{array} \right. \rightarrow R_f = \sqrt{(-\infty, 8]} = (-\infty, 4]$$