

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

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

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

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

$$\boxed{a=0}$$

$$\boxed{b=-2}$$

$$\boxed{c=-4}$$

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

$$f(x) = -x$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$x \neq 2 \rightarrow \text{ممنوع}$$

$$g \neq -1 \rightarrow \text{ممنوع}$$

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

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

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

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

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

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

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

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

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

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

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$$\text{ا) } y = x^3 - 2x^2 + x$$

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

$$y-1 = (x-1)^2$$

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

$$R_f = \mathbb{R}$$

$$\text{ب) } yx^2 - 2yx = 1$$

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

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

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

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

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$$\text{ا) } S \mid \begin{matrix} x = \frac{f}{y} = 2 \\ y = 4 \end{matrix} \quad R_f = [4, +\infty)$$

$$\text{ب) } S \mid \begin{matrix} x = \frac{-f}{y} = 3 \\ y = 3 \end{matrix} \quad y \geq 0$$

$$R_f = [0, \sqrt{3}]$$

$$\text{ج) } S \mid \begin{matrix} x = \frac{-f}{y} = 3 \\ y = 12 \end{matrix} \quad R_f = (-\infty, 12]$$

$$\text{د) } S \mid \begin{matrix} x = \frac{f}{y} = 2 \\ y = -4 \end{matrix} \quad y \geq 0 \quad R_f = [0, +\infty)$$

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$$\text{ا) } R_f = \mathbb{R}$$

$$\text{ب) } R_f = [0, +\infty)$$

$$\text{ج) } R_f = \mathbb{R}$$

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$$\text{د) } R_f = [0, +\infty)$$

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

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