

$$\rightarrow f(x) = \sqrt{x + 4\sqrt{x-4}} = \sqrt{x-4 + 4\sqrt{x-4} + 4} = \sqrt{(\sqrt{x-4} + 2)^2} = |\sqrt{x-4} + 2| = \sqrt{x-4} + 2$$

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

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

$$\rightarrow f(x) = \frac{x+2}{(x-1)(x-3)} \rightarrow f(1) = \frac{3}{(1)(-1)} = -3 \checkmark$$

$$\begin{aligned} f(1) &= \frac{3}{0} \Rightarrow x \\ f(3) &= \frac{5}{0} \Rightarrow x \\ f(0) &= \frac{2}{(-3)(-1)} = \frac{2}{3} \checkmark \end{aligned} \Rightarrow \begin{aligned} \frac{g}{f}(1) &= -\frac{1}{2} \\ \frac{g}{f}(0) &= 4 \end{aligned} \Rightarrow \left\{ (1, -\frac{1}{2}), (0, 4) \right\}$$

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

ب) $f(x^2) = ? \rightarrow \begin{cases} x^2 = 1 \rightarrow x = \pm 1 \\ x^2 = 3 \rightarrow x = \pm\sqrt{3} \\ x^2 = 4 \rightarrow x = \pm 2 \\ x^2 = -1 \rightarrow \text{no real } x \end{cases} \Rightarrow \left\{ (1, 2), (-1, 2), (\sqrt{3}, -1), (-\sqrt{3}, -1), (2, 2), (-2, 2) \right\}$

ج) $2g^2(x) + 1 = \left\{ (-2, 19), (2, 3), (2, 9), (-1, 1) \right\}$

بیم مولفه ها در سوال رو به توان ۲ برسون و بعد مندرج کنیم و بعد به اضافه یک کنیم

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

ه) $h(x) = 2f(x) + g(x) \rightarrow \text{شکل } x = -2, 2, 3 \Rightarrow \left\{ (-2, 4), (2, 5), (3, 5) \right\}$

و) $\left(\frac{f}{g+1} \right)(x) = \frac{\frac{\sqrt{x^2-x}}{x-2}}{\frac{x}{x-2} + 1} \rightarrow \sqrt{x^2-x} \geq 0 \rightarrow \sqrt{x} \geq x \rightarrow x^2 \geq x^2 \rightarrow x^2 - x \leq 0 \rightarrow x(x-1) \leq 0$

$\rightarrow x \geq 0 \rightarrow x \leq 1$ و $x \neq 2$

$x \notin \mathbb{Z} \Rightarrow [x] + [-x] = -1 \rightarrow \text{چون صحیح}$

$x \in \mathbb{Z} \Rightarrow [x] + [-x] = 0 \rightarrow \text{صحیح}$

$\Rightarrow x \in \mathbb{Z}$

$$\frac{3}{+1-1+1} = \frac{3}{1} = 3$$

$\Rightarrow D = \{0, 1, 3\}$

$$f(x) = \sqrt{5x - x^2 - 6} = \sqrt{-(x-1)(x+6)} \Rightarrow \frac{-x-1}{-1+1} \Rightarrow x \neq -3, -2, -1, 0 \rightarrow \text{hms, } \{(1,0), (2,0), (3, \sqrt{3})\}$$

$$\text{الف) } y = x^3 - 3x^2 + 3x \xrightarrow{\text{تبدیل و ساده‌سازی}} y = x^3 - 3x^2 + 3x + 1 - 1 = (x-1)^3 + 1 \rightarrow x = \sqrt[3]{y-1} + 1 \rightarrow R_f, \mathbb{R}$$

$$\text{ب) } \rightarrow yx^2 - 2xy = 1 \rightarrow yx^2 - 2xy - 1 = 0 \xrightarrow{\Delta} x = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y} \rightarrow 4y(y+1) \geq 0 \rightarrow \frac{-1}{+1} \leq \frac{0}{-1} \rightarrow R_f, (-\infty, -1] \cup (0, +\infty)$$

$y \neq 0$

$$\text{الف) } a > 0 \rightarrow \min_{x \in \mathbb{R}} \Rightarrow \text{ext} \left| \frac{-b}{2a} = 2 \right| \rightarrow [4, +\infty) \cup R_f$$

$$\text{ب) } a < 0 \rightarrow \max_{x \in \mathbb{R}} \Rightarrow \text{ext} \left| \frac{-b}{2a} = 12 \right| \rightarrow (-\infty, 12] \cup R_f$$

$$\text{ج) } a > 0 \rightarrow \min_{x \in \mathbb{R}} \Rightarrow \text{ext} \left| \frac{-b}{2a} = -1 \right| \xrightarrow{\sqrt{}} \sqrt{[-1, +\infty)} = [0, +\infty)$$

$$\text{د) } a < 0 \rightarrow \max_{x \in \mathbb{R}} \Rightarrow \text{ext} \left| \frac{-b}{2a} = 9 \right| \xrightarrow{\sqrt{}} \sqrt{(-\infty, 9]} \cup [0, 3]$$

الف) $\mathbb{R}$ ب) $\mathbb{R}$
چون بزرگترین توان عبارت، فرد هست.

ج) $\mathbb{R} \xrightarrow{\sqrt{}} [0, +\infty)$ د) $\mathbb{R} \xrightarrow{\sqrt{}} [0, +\infty)$
توان زوج، جوابش نامنفی می‌باشد.

$$\text{الف) } \rightarrow \mathbb{R} - \left\{ \frac{a}{c} \right\} = \mathbb{R} - \{3\}$$

$$\text{ب) } \rightarrow \mathbb{R} - \left\{ \frac{a}{c} \right\} = \mathbb{R} - \{2\}$$