

$f(x) = \sqrt{x+4}\sqrt{x-4}$ و $g(x) = \sqrt{x-4}\sqrt{x-4}$ و $x \geq 4$ $f(x)+g(x) = a+b\sqrt{x+c} \rightarrow \frac{a+b}{c} = ?$
 $S = f(x)+g(x) \rightarrow S' = x+4\sqrt{x-4} + x-4\sqrt{x-4} + 2\sqrt{(x+4)(x-4)} = x^2 - 16(x-4) = x^2 - 16x + 64$
 $= (x-4)^2 \xrightarrow{x \geq 4} \sqrt{(x-4)^2} = x-4 \rightarrow S' = 2x - 2(x-4) = 8x - 16 = 8(x-4)$
 $\rightarrow S = 2\sqrt{x-4} \rightarrow a=0, b=2, c=-4 \rightarrow \frac{a+b}{c} = \frac{2}{-4} = -\frac{1}{2}$ جواب: $-\frac{1}{2}$

$f(x) = \frac{x+2}{x^2-4x+3}$ و $g(x) = \{(2, 1), (0, 1), (3, 0), (0, 4)\}$
 $f(x) \xrightarrow{\text{باز کردن مخرج}} \{(2, -4), (1, 0), (3, 0), (0, \frac{2}{3})\}$
 $\Rightarrow \frac{g}{f} = \{(2, -\frac{1}{4}), (0, 6)\}$ جواب: $-\frac{1}{4}$

$f(x) = \{(1, 2), (3, -1), (4, 2), (-1, 4)\}$ و $g(x) = \{(-2, 3), (1, -1), (3, 2), (-1, 0)\}$
 الف) $f(x) = \{(\frac{1}{2}, 2), (\frac{3}{4}, -1), (2, 2), (-\frac{1}{4}, 4)\}$
 ب) $f(x) = \{(-2, 2), (-1, 2), (1, 2), (2, 2)\}$
 ج) $2g(x)+1 = \{(-2, 7), (1, 7), (3, 7), (-1, 1)\}$
 د) $\frac{f}{g} = \{(1, -4), (3, -1)\}$

$f(x) = \{(2, 1), (3, 1), (4, 9), (-1, 0)\}$ و $g(x) = \{(1, 0), (2, 3), (-1, 6), (-1, 2), (3, 4)\}$
 $h = 2f + g = ?$ $h(2) = 2 \times 1 + 3 = 5$ $h(3) = 5$ $h(-1) = 2 \times 9 + 6 = 24$
 $h = 2f + g \rightarrow h = \{(2, 5), (3, 5), (-1, 24)\}$ جواب: 5

$f(x) = \frac{\sqrt{3x-x}}{x-2}$ و $g(x) = [x] + [-x]$ $(\frac{f}{g})(x)$

$\sqrt{3x-x} \geq 0 \rightarrow 0 \leq x \leq 3$ و $x \neq 2$
 $g(x) = [x] + [-x] \rightarrow \begin{cases} 0 & x \in \mathbb{Z} \\ -1 & x \notin \mathbb{Z} \end{cases} \rightarrow D = \{0, 1, 3\}$ جواب: $\{0, 1, 3\}$

$$f(x) = \sqrt{5x - x^2 - 4} \rightarrow D = -x^2 + 5x - 4 \geq 0 \rightarrow \text{شبهه} = 1, \frac{c}{a} \rightarrow 1, 4 \rightarrow \frac{1}{-1} + \frac{4}{1} = 3 \rightarrow D = \{x \mid 1 \leq x \leq 4\}$$

$$\rightarrow f(x) = \{(1, 0), (2, \sqrt{2}), (3, \sqrt{2}), (4, 0)\} \text{ و } g(x) = \{(1, 3), (2, 2), (3, 4), (4, 1)\} \rightarrow$$

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

$$y = x^3 - 3x^2 + 3x \rightarrow y = (x^3 - 3x^2 + 3x - 1) + 1 = (x-1)^3 + 1 \rightarrow y - 1 = (x-1)^3 \rightarrow \sqrt[3]{y-1} = x-1 \rightarrow x = \sqrt[3]{y-1} \rightarrow R_y = \mathbb{R} \rightarrow \text{جواب}$$

$$\rightarrow y = \frac{1}{x^2 - 2x} = yx^2 - 2yx - 1 = 0 \rightarrow (-2y)^2 - 4(y)(-1) \geq 0 \rightarrow 4y^2 + 4y \geq 0 \rightarrow 4y(y+1) \geq 0$$

$$\text{شبهه} = -1 \text{ و } 0 \rightarrow \frac{1}{+1} + \frac{0}{-1} = 1 \rightarrow R_y = (-\infty, -1] \cup (0, +\infty) \rightarrow \text{جواب}$$

$$\text{الف) } y = x^2 - 6x + 10 \xrightarrow{x = \frac{-b}{2a}} \text{ext} = \frac{1}{4} \rightarrow R_y = [\frac{9}{4}, +\infty)$$

$$\text{ب) } y = -x^2 + 4x + 3 \xrightarrow{x = \frac{-b}{2a}} \text{ext} = \frac{7}{4} \rightarrow R_y = (-\infty, \frac{7}{4}]$$

$$\text{ج) } y = \sqrt{x^2 - 6x + 3} \xrightarrow{x = \frac{-b}{2a}} \text{ext} = \frac{3}{2} \rightarrow R_y = [0, +\infty)$$

$$\text{د) } y = \sqrt{4x - x^2} \xrightarrow{x = \frac{-b}{2a}} \text{ext} = \frac{2}{1} \rightarrow R_y = (-\infty, \sqrt{4}] = (-\infty, 2]$$

$$\text{الف) } y = x^3 - 5x^2 + 2x + 1 \rightarrow R_y = \mathbb{R} \rightarrow \text{چون مشتق توان فرد است}$$

$$\text{ب) } y = x^5 - 6x^4 + 3x + 2 \rightarrow R_y = \mathbb{R} \rightarrow \dots \dots \dots$$

$$\text{ج) } y = \sqrt{x^5 - 6x^4 + 5x + 1} \rightarrow R_y = [0, +\infty)$$

$$\text{د) } y = (x^5 - 6x^4 + 3x + 1)^2 \rightarrow R_y = [0, +\infty) \rightarrow \text{بدلیل توان ۲ تمام اعداد داخل برد از ۰ تا +\infty هستند}$$

$$\text{الف) } y = \frac{3x+1}{x-2} \rightarrow R = \mathbb{R} - \{\frac{a}{c}\} \rightarrow R_y = \mathbb{R} - \{3\}$$

$$\text{ب) } y = \frac{2x+1}{x+1} \rightarrow R = \mathbb{R} - \{\frac{a}{c}\} \rightarrow R_y = \mathbb{R} - \{2\}$$