

آزمایش ۱۱

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

$f(x) = \frac{x+2}{x^2-4x+3}$ و $g(x) = \{(2, 1), (0, 1), (3, 0), (0, 4)\}$
 $f(x) \xrightarrow{\text{بقدر 9}} \{(2, -4), (1, 0), (3, 0), (0, \frac{2}{3})\}$
 $\Rightarrow \frac{g}{f} = \{(2, \frac{1}{-4}), (0, 4)\}$

$f(x) = \{(1, 2), (3, -1), (4, 2), (-1, 4)\}$ و $g(x) = \{(-2, 3), (1, -1), (3, 2), (-1, 0)\}$
 الف) $f(2x) = \{(1, \frac{1}{2}), (3, \frac{1}{2}), (4, \frac{1}{2}), (-1, \frac{1}{2})\}$
 ب) $f(2x) = \{(-2, 1), (-1, 2), (1, 2), (2, 3)\}$ $x^2 = 3 \rightarrow x = \pm\sqrt{3}$
 ج) $2g^2(x)+1 = \{(-2, 1), (1, 3), (3, 9), (-1, 1)\}$ $(-\sqrt{3}, -1), (\sqrt{3}, -1)$
 د) $\frac{2f}{g} = \{(1, -4), (3, -1)\}$

$f(x) = \{(2, 1), (3, 1), (4, 9), (-1, 0)\}$ و $g(x) = \{(1, 2), (2, 3), (-1, 4), (-1, 2), (3, 2)\}$
 $h = 2f + g = ?$ $h(2) = 2 \times 1 + 3 = 5$ $h(3) = 5$ $h(-1) = 2 \times 9 + 4 = 22$
 $h = 2f + g \rightarrow h = \{(2, 5), (3, 5), (-1, 22)\}$

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

$$f(x) = \sqrt{5x - x^2 - 4} \rightarrow B = -x^2 + 5x - 4 \geq 0 \rightarrow \text{شعبه} = 1, \frac{c}{a} \rightarrow 5 \quad \frac{1}{-1} + \frac{4}{5} \rightarrow B_y \text{ و } \{4\}$$

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

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

جواب

$$y = x^3 - 3x^2 + 3x \rightarrow y = (x^3 - 3x^2 + 3x - 1) + 1 = (x-1)^3 + 1 \rightarrow y - 1 = (x-1)^3 \rightarrow$$

$$\sqrt[3]{y-1} = x-1 \rightarrow x = \sqrt[3]{y-1} \rightarrow R_y = \mathbb{R}$$

جواب

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

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

جواب

$$\text{الف) } y = x^2 - 6x + 10 \xrightarrow{x = \frac{-b}{2a}} \text{ext} \Big|_6 \rightarrow R_y = [4, +\infty)$$

$$\rightarrow y = -x^2 + 6x + 3 \xrightarrow{x = \frac{-b}{2a}} \text{ext} \Big|_{12} \rightarrow R_y = (-\infty, 12]$$

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

$$\rightarrow y = \sqrt{6x - x^2} \xrightarrow{x = \frac{-b}{2a}} \text{ext} \Big|_9 \rightarrow R_y = (-\infty, \sqrt{9}] = (-\infty, 3]$$

اعداد منتهی حده منتهی هستند

$$\text{الف) } y = x^3 - 6x^2 + 2x + 1 \rightarrow R_y = \mathbb{R}$$

چون مشتق مرتبه فرد است

$$\rightarrow y = x^5 - 6x^4 + 2x + 2 \rightarrow R_y = \mathbb{R}$$

$$\text{ج) } y = \sqrt{x^5 - 6x^4 + 2x + 1} \rightarrow R_y = [0, +\infty)$$

$$\rightarrow y = (x^5 - 6x^4 + 2x + 1)^2 \rightarrow R_y = [0, +\infty)$$

به دلیل توان ۲ تمام اعداد داخل برد از ۰ تا +∞ هستند

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

$$\rightarrow y = \frac{2x+1}{x+1} \rightarrow R = \mathbb{R} - \left\{\frac{a}{c}\right\} \rightarrow R_y = \mathbb{R} - \{2\}$$

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(۳) x های f باید مقیم بر ۲ شوند! $f(x) = \left\{ \left(\frac{1}{2}, 2\right) \left(\frac{\sqrt{2}}{2}, -1\right) (2, 2) \left(-\frac{1}{2}, 4\right) \right\}$

هر کدام از x های f را برابر x^2 قرار دهیم! $f(x^2) = \left\{ (1, 2) (-1, 2) (\sqrt{2}, -1) (-\sqrt{2}, -1) (2, 2) (-2, 2) \right\}$

این عمل ردی و های و اعمال می شود: $g^2(x) + 1 = \left\{ (-2, 19) (1, 3) (3, 9) (-1, 1) \right\}$

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

الف - ۱ $y = x^2 - 2x + 1 \rightarrow \min \begin{cases} x = \frac{2}{2} = 1 \\ y = 1 - 2 + 1 = 0 \end{cases} \rightarrow Rf = [0, +\infty)$

ب - ۱ $y = -x^2 + 4x + 3 \rightarrow \max \begin{cases} x = \frac{-4}{-2} = 2 \\ y = -9 + 18 + 3 = 12 \end{cases} \rightarrow Rf = (-\infty, 12]$

ج - ۱ $y = x^2 - 2x - 3 \rightarrow \min \begin{cases} x = \frac{2}{2} = 1 \\ y = 1 - 2 - 3 = -4 \end{cases} \rightarrow Rf = \sqrt{[-4, +\infty)} = [-4, +\infty)$

د - ۱ $y = 4x - x^2 \rightarrow \max \begin{cases} x = \frac{-4}{-2} = 2 \\ y = 18 - 4 = 14 \end{cases} \rightarrow Rf = \sqrt{(-\infty, 14]} = (-\infty, 14]$