

۱۹۱۷۵ آفرین به سنا

نام و نام خانوادگی: شماره: ۷ کلاس: (غیر)

$f(x) = \sqrt{x+4}\sqrt{x-4}$, $g(x) = \sqrt{x-4}\sqrt{x-4}$, $f(x)+g(x) = a+b\sqrt{x+c}$, $\frac{a+b}{c} = ?$
 $x-4 = (\sqrt{x-4})^2 \Rightarrow t = \sqrt{x-4} \Rightarrow x = t^2+4 \rightarrow f(x) = \sqrt{t^2+4+4} = \sqrt{(t+2)^2} = t+2$
 $\hookrightarrow g(x) = \sqrt{t^2+4-4} = \sqrt{t^2} = |t-2| \xrightarrow{x \geq 4} x-4 \geq 0 \rightarrow \sqrt{x-4} \geq 0 \rightarrow t \geq 2 \rightarrow g(x) = t-2$
 $\frac{f(x)+g(x)}{(t+2)+(t-2)} = 2t \xrightarrow{t=\sqrt{x-4}} 2\sqrt{x-4} = a+b\sqrt{x+c} \Rightarrow \begin{cases} a=0 \\ b=2 \\ c=-4 \end{cases} \Rightarrow \frac{a+b}{c} = \frac{0+2}{-4} = -\frac{1}{2}$

$f(x) = \frac{x+2}{x^2-4x+3}$, $g(x) = \{(2,1), (1,0), (3,5), (0,4)\}$
 $f(x) = \frac{x+2}{(x-1)(x-3)} \rightarrow D_f = \mathbb{R} - \{1, 3\}$
 $f(2) = \frac{2+2}{2^2-8+3} = -\frac{4}{3} \rightarrow \frac{g(2)}{f(2)} = \frac{1}{-\frac{4}{3}} = -\frac{3}{4}$
 $f(0) = \frac{0+2}{0^2-0+3} = \frac{2}{3} \rightarrow \frac{g(0)}{f(0)} = \frac{4}{\frac{2}{3}} = 6$
 $\frac{g}{f} = \{(2, -\frac{3}{4}), (0, 6)\}$

$f(x) = \{(1,2), (3,-1), (4,2), (-1,4)\}$, $g(x) = \{(-2,3), (1,-1), (3,2), (-1,0)\}$
 الف) $f(2x) = \{(\frac{1}{2}, 2), (\frac{3}{2}, -1), (\frac{4}{2}, 2), (-\frac{1}{2}, 4)\} \rightarrow 2x \in \{1, 3, 4, -1\}$
 ب) $f(x^2) \Rightarrow x \in D_f = \{1, 3, 4, -1\} \rightarrow \{(-2,2), (-1,2), (1,2), (2,2)\}$
 ج) $2g^2(x) \rightarrow \begin{cases} g(-2) = 3 \rightarrow 2 \cdot 9 = 18 \\ g(1) = -1 \rightarrow 2 \cdot 1 = 2 \\ g(3) = 2 \rightarrow 2 \cdot 4 = 8 \\ g(-1) = 0 \rightarrow 2 \cdot 0 = 0 \end{cases} \rightarrow \{(-2, 18), (1, 2), (3, 8), (-1, 0)\}$
 د) $\frac{f}{g} \Rightarrow \frac{f}{g} = \{(1,4), (3,-2), (4,2), (-1,2)\} \rightarrow \frac{f}{g} \Rightarrow \text{دامنه مشترک: } 1, 3 \Rightarrow \frac{f}{g} = \{(1, -\frac{4}{3}), (3, -\frac{1}{2})\}$

$f(x) = \{(2,1), (3,1), (4,9), (-2,0)\}$, $g(x) = \{(5,1), (2,3), (-2,4), (3,3), (-1,2)\}$, $h = 2f + g$
 $2f = \{(2,2), (3,2), (4,18), (-2,0)\}$
 $2f + g \rightarrow 2, 3, -2$
 $2f + g = \{(2,5), (3,5), (-2,4)\}$

$f(x) = \frac{\sqrt{3x-x}}{x-2}$, $g(x) = [x] + [-x]$, $D(\frac{f}{g+1})(x) = ?$
 $\forall x \geq 0 \rightarrow x \geq 0 \Rightarrow \sqrt{3x-x} \geq 0 \Rightarrow \sqrt{2x} \geq 0 \xrightarrow{x \geq 0} 3x \geq x \rightarrow x^2-3x \leq 0 \rightarrow x(x-3) \leq 0 \rightarrow 0 \leq x \leq 3$
 $x-2 \neq 0 \rightarrow x \neq 2 \Rightarrow D_f = [0, 3] - \{2\}$ I
 $g(x) = \begin{cases} 0 & x \in \mathbb{Z} \\ -1 & x \notin \mathbb{Z} \end{cases} \rightarrow g(x)+1 = \begin{cases} 1 & x \in \mathbb{Z} \\ 0 & x \notin \mathbb{Z} \end{cases} \rightarrow g(x)+1 \neq 0 \rightarrow x \in \mathbb{Z}$ II
 $I \cap II = \{0, 1, 3\} = D_{\frac{f}{g+1}}$

$$f(x) = \sqrt{5x - x^2}, g(x) = \{(1,3), (2,2), (3,4), (5,1)\}, h(x) = \frac{f(x)}{g(x)}$$

$$-x^2 + 5x - 4 \geq 0 \rightarrow x^2 - 5x + 4 \leq 0 \rightarrow (x-1)(x-4) \leq 0 \rightarrow 1 \leq x \leq 4 \rightarrow D_f = [1, 4]$$

$$D_g = \{1, 2, 3, 5\} \Rightarrow D_f \cap D_g = \{1, 2, 3\}$$

$$h = \{(1,0), (2, \frac{\sqrt{2}}{2}), (3,0)\}$$

$$\begin{aligned} f(1) &= \sqrt{5-1-4} = \sqrt{0} = 0 \\ f(2) &= \sqrt{10-4-4} = \sqrt{2} \\ f(3) &= \sqrt{15-9-4} = \sqrt{0} = 0 \end{aligned}$$

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

ب) $y = \frac{1}{x^2 + 2x} \rightarrow yx^2 - 2xy = 1 \rightarrow yx^2 - 2xy - 1 = 0 \rightarrow \Delta = 4y^2 + 4y \rightarrow \Delta \geq 0$
 $4y^2 + 4y \geq 0 \rightarrow 4y(y+1) \geq 0 \rightarrow y(y+1) \geq 0 \rightarrow y = -1 \} \frac{-1 \pm 0}{+1-1} \rightarrow (-\infty, -1], [0, +\infty)$
 $y = 0$

الف) $y = x^2 - 4x + 10 \rightarrow \min \left| \frac{-b}{2a} = \frac{4}{2} = 2 \right| R = [2, +\infty)$

ب) $y = -x^2 + 4x + 3 \rightarrow \max \left| \frac{-b}{2a} = \frac{4}{-2} = -2 \right| R = (-\infty, 12]$

ج) $y = \sqrt{x^2 - 6x - 3} \rightarrow \min \left| \frac{6}{2} = 3 \right| R = [-3, +\infty) \xrightarrow{\sqrt{\quad}} [0, +\infty) = R$

د) $y = \sqrt[3]{4x - x^2} \rightarrow \max \left| \frac{4}{2} = 2 \right| R = (-\infty, 9] \xrightarrow{\sqrt[3]{\quad}} R = [0, 3]$

الف) $y = x^3 - 5x^2 + 2x + 1 \rightarrow R = (-\infty, +\infty)$

ب) $y = x^3 - 9x^2 + 3x + 2 \rightarrow R = (-\infty, +\infty)$

ج) $y = \sqrt{x^3 - 9x^2 + 5x + 1} \rightarrow R = [0, +\infty) \rightarrow$ از زیر رادیکال اعداد مثبت بیرون آیند

د) $y = (x^3 - 4x^2 + 3x + 1)^2 \rightarrow R = [0, +\infty) \rightarrow$ اعداد صحیح بین ۰ و ۲ رسیده مثبت اند.

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

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

$$f_{(2n)} = \left\{ \left(\frac{1}{2}, 2 \right) \left(\frac{3}{2}, -1 \right) (2, 2) \left(-\frac{1}{2}, 4 \right) \right\} \quad \text{ن های } f \text{ باید تخیم برآیند!} \quad (3)$$

$$f_{(5)} = \left\{ (1, 2) (-1, 2) (\sqrt{3}, -1) (-\sqrt{3}, -1) (2, 2) (-2, 2) \right\} \quad \text{هر کدام از } n \text{ های } f \text{ را برابر } n^2 \text{ قرار دهیم!}$$

$$g_{(n)}^{(2)} + 1 = \left\{ (-2, 19) (1, 3) (3, 9) (-1, 1) \right\} \quad \text{این عمل روی و های و اعمال می شود:}$$

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