

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

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نیمه محقق دارد

$$g(x) = \sqrt{x-4}\sqrt{x-4} = \sqrt{(x-4)^2} \Rightarrow g(x) = |\sqrt{x-4} - 2| \xrightarrow{x \geq 4} \Rightarrow g(x) = \sqrt{x-4} - 2$$

د

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

$$f(x) = \frac{x+2}{x^2-4x+2}$$

$$\frac{g}{f} = \left\{ (0, 2), (2, \frac{1}{2}) \right\}$$

$$g(2) = 1$$

$$g(0) = 2$$

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$$g(x) = \{(2, 1), (1, 0), (3, 0), (0, 2)\}$$

$$f(x) = \{(1, 2), (3, 1), (4, 2), (-1, 2)\}, \quad g(x) = \{(2, 3), (1, -1), (3, 2), (-1, 0)\}$$

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

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

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

$$\Rightarrow \frac{1}{9} = \{(1, -2), (2, -1)\} \rightarrow \text{چون } -1 = x$$

$$h = f+g = \{(2, 0), (3, 0), (-2, 0)\}$$

اصول قضیه آخر

$$f(x) = \frac{\sqrt{3x-x}}{x-2}$$

$$\Rightarrow \sqrt{3x-x} \geq x \Rightarrow 3x \geq x^2 \Rightarrow -x^2 + 3x \geq 0 \Rightarrow \frac{0}{-1} + \frac{3}{1} \Rightarrow D_f = [0, 3] - \{2\}$$

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$$g(x)+1 = [x] + [-x] + 1 = 0 \Rightarrow g(x) = -1$$

$$[0, \infty) \cap [0, 3] - \{2\} = [0, 2] - \{2\} = \{0\}$$

$$x < 2 \Rightarrow g(x) = 0 \quad \text{غیر صحیح}$$

$$f(x) = \sqrt{-x^2 + 6x - 4}$$

$$\frac{1}{-1} + \frac{0}{1} = -1$$

$$g(x) = \{(1, 3), (2, 2), (4, 1), (0, 1)\}$$

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

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

$$ب) y = \frac{1}{x^2-2x} \Rightarrow y(x^2-2x) = 1 \Rightarrow x^2-2x+1 = \frac{1}{y} \Rightarrow (x-1)^2 - 1 = \frac{1}{y} \Rightarrow x-1 = \sqrt{\frac{y+1}{y}}$$

$$\Rightarrow x = \sqrt{\frac{y+1}{y}} + 1 \rightarrow \frac{-1}{1} + \frac{0}{1} = -1 \Rightarrow R_f = \mathbb{R} - (-1, 0]$$

$$f(x) = x^5 - 4x + 10 \quad \Rightarrow \quad e^{x/1} \left| \frac{-\frac{1}{x^4}}{\frac{-4}{x^5}} \right| = \frac{1}{x} \Rightarrow R_f = \left[\frac{1}{x}, +\infty \right)$$

$$-1) y = -x^4 + 7x + 13 \Rightarrow e^{x/1} \left| \frac{\frac{7}{x^4}}{y} \right| = \frac{7}{y} \Rightarrow R_f = \left(-\infty, \frac{7}{y} \right]$$

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$$2) y = \sqrt{x^5 - 4x + 13} \Rightarrow e^{x/1} \left| \frac{\frac{5x^4}{2\sqrt{x^5 - 4x + 13}}}{y} \right| = \frac{5x^4}{2y^2} \Rightarrow R_f = \left(\frac{5x^4}{2y^2}, +\infty \right)$$

دسترس است. داخل برآورد را یافته است. بردار فاصله از زیر را بداند

$$3) y = \sqrt{-x^4 + 7x} \Rightarrow e^{x/1} \left| \frac{\frac{7}{2\sqrt{-x^4 + 7x}}}{y} \right| = \frac{7}{2y^2} \Rightarrow \sqrt{(-\infty, 7]} = [0, 7]$$

$$\text{الف) } y = x^5 - 6x^4 + 7x + 1 \Rightarrow \text{برای بررسی میزنیم} \rightarrow R_f = \mathbb{R} \quad \text{ب) } y = x^5 - 4x^4 + 7x + 13 \Rightarrow R_f = \mathbb{R}$$

$$\text{ج) } y = \sqrt{x^5 - 4x^4 + 7x + 1} \Rightarrow R_f = \sqrt{1R} = \mathbb{R}^+ \quad \text{د) } y = (x^5 - 4x^4 + 7x + 1)^2 \Rightarrow R_f = (\mathbb{R})^2 = \mathbb{R}^+$$

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$$\text{الف) } y = \frac{7x + 1}{x - 7} \Rightarrow a = 7, c = 1 \Rightarrow R_f = \mathbb{R} - \left\{ \frac{a}{c} \right\} = \mathbb{R} - \{1\}$$

$$\text{ب) } y = \frac{7x + 1}{x + 1} \Rightarrow a = 7, c = 1 \Rightarrow R_f = \mathbb{R} - \left\{ \frac{a}{c} \right\} = \mathbb{R} - \{7\}$$

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$$f(n) = \frac{\sqrt{3n} - n}{n-2} \rightarrow \begin{cases} n \neq 2 \\ n \geq 0 \end{cases} (\sqrt{3n}) \rightarrow D_f = [0, 2] - \{2\} \quad (\infty)$$

$$\begin{cases} \sqrt{3n} - n \geq 0 \rightarrow 3n \geq n^2 \rightarrow 0 \leq n \leq 3 \end{cases}$$

$$g(n) + 1 \neq 0 \rightarrow g(n) \neq -1 \rightarrow [n] + [-n] \neq -1 \rightarrow n \in \mathbb{Z}$$

$$D_{\frac{f}{g+1}} = \left\{ D_f \cap D_g, g(n) \neq -1 \right\} = \left\{ 0, 1, 3 \right\}$$

$$[0, 3] - \{2\} \cap \mathbb{Z}$$

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

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

ج - ۱) $y = n^2 - 2n - 3 \rightarrow \min \begin{cases} n = \frac{2}{2} = 1 \\ y = 1 - 2 - 3 = -4 \end{cases} \rightarrow R_f = \sqrt{[-4, +\infty)} = [0, +\infty)$

د - ۱) $y = 4n - n^2 \rightarrow \max \begin{cases} n = \frac{-4}{-2} = 2 \\ y = 18 - 9 = 9 \end{cases} \rightarrow R_f = \sqrt{(-\infty, 9]} = [0, 3]$

الف) $R_f \subset \mathbb{R}$

۹) قیاس درجه فرد بدی برابر $\mathbb{R}$ دارند!

ب) $R_f \subset \mathbb{R}$

ج) $R_f \subset \sqrt{\mathbb{R}} = [0, +\infty)$

د) $R_f \subset (\mathbb{R})^2 = [0, +\infty)$