

$$x=1 \rightarrow f(1)+g(1)=\sqrt{1+4\sqrt{1-4}}+\sqrt{1-4\sqrt{1-4}}=\sqrt{1+4}+\sqrt{1-4}=4$$

$$x=9 \rightarrow f(9)+g(9)=\sqrt{9+4\sqrt{9-4}}+\sqrt{9-4\sqrt{9-4}}=\sqrt{(2+\sqrt{5})^2}+\sqrt{(2-\sqrt{5})^2}=2+\sqrt{5}+2-\sqrt{5}=4$$

$$\left. \begin{aligned} a+b\sqrt{1+c} &= 4 \\ a+b\sqrt{9+c} &= 2\sqrt{5} \end{aligned} \right\} \ominus \Rightarrow b(\sqrt{1+c}-\sqrt{9+c})=2(2-\sqrt{5}) \quad |2+\sqrt{5}|+|2-\sqrt{5}|=4 \Rightarrow 2\sqrt{5}=2\sqrt{5}$$

$$\frac{a+b}{c} = \frac{0+2}{-4} = -\frac{1}{2} \quad b = \frac{1}{2} \quad \sqrt{1+c} = \sqrt{4} \quad c = -4 \quad a+2\sqrt{1-4}=4 \quad a=0$$

$$f(x) = \left\{ (2, -4) (1, 0) (3, 0) (0, \frac{1}{2}) \right\}$$

$$g(x) = \left\{ (2, 1) (1, 0) (3, 5) (0, 4) \right\}$$

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

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

$$ب) f(x^2) = \left\{ (1, 2) (-1, 2) (+\sqrt{3}, -1) (-\sqrt{3}, -1) (2, 2) (-2, 2) \right\}$$

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

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

$$h = 2f + g = \left\{ (2, 5) (3, 5) (-2, 4) \right\}$$

$$D_f: \forall x > 0 \Rightarrow x > 0$$

$$\sqrt{3x} - x \geq 0 \Rightarrow x \leq \sqrt{3x} \Rightarrow x^2 - 3x \leq 0 \Rightarrow x(x-3) \leq 0$$

$$x \neq 1$$

$$\frac{f(x)}{g(x)+1} \rightarrow \frac{\sqrt{3x}-x}{(x-1)([x]+[-x]+1)}$$

$$x \neq 1 \quad x \in \mathbb{Z}$$

$$D = \left\{ 0, 3 \right\}$$

$$f(x) = \sqrt{5x - x^2 - 4} \rightarrow (x^2 - 5x + 4) \geq 0 \quad \begin{array}{|c|c|} \hline 1 & 4 \\ \hline - & + \\ \hline \end{array}$$

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

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

دقت!

$$\rightarrow (2, \frac{\sqrt{1-4-4}}{2}) = (2, \sqrt{\frac{1}{2}})$$

(1, 2)

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الف) $R_f = \mathbb{R}$

1, 2

به دایره بارش اصلی نیست
آورده شود!

ب) $yx^2 - 2yx = 1$

$$\Delta = (-2y)^2 - 4(y)(-1) = 4y^2 + 4y$$

1

1, 2 $yx^2 - 2yx(-1) = 0$

$$y = \frac{+2y \pm \sqrt{4y^2 + 4y}}{2}$$

$$4y^2 + 4y \geq 0$$

$$R_f = (-\infty, -1] \cup [0, \infty)$$

$y = 0 \rightarrow 0 - 1 = -1$

باشه! $y \neq 0$ عبارت را درجه 2 فرض کنیم!

$$4y^2 + 4y \geq 0$$

$$y(y+1) \geq 0$$

$$\begin{array}{|c|c|c|} \hline -1 & 0 & + \\ \hline + & - & + \\ \hline \end{array}$$

7

الف) $y = x^2 - 5x + 10$

$$x_s = \frac{+5}{2} = 2.5$$

$$y_s = 2.5^2 - 5(2.5) + 10 = 4$$

$$R_f = [4, +\infty)$$

ب) $y = -x^2 + 4x + 3$

$$x_s = \frac{4}{-2} = -2$$

$$y_s = -(-2)^2 + 4(-2) + 3 = -7$$

$$R_f = (-\infty, 12]$$

ج) $\sqrt{x^2 - 5x - 3}$

$$x_s = \frac{5}{2} = 2.5$$

$$y_s = 2.5^2 - 5(2.5) - 3 = -7$$

$$R_f = [0, +\infty)$$

د) $\sqrt{-x^2 + 4x}$

$$x_s = \frac{4}{-2} = -2$$

$$y_s = -(-2)^2 + 4(-2) = -8$$

$$R_f = [0, 3]$$

8

الف) $y = x^3 - 5x^2 + 2x + 1$

$$R_f = \mathbb{R}$$

ب) $y = x^4 - 6x^2 + 3x + 2$

$$R_f = \mathbb{R}$$

ج) $y = \sqrt{x^4 - 6x^2 + 5x + 1}$

$$R_f = [0, +\infty)$$

(1, 2)

د) $y = (x^2 - 5x^2 + 3x + 1)^2$

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

فقط حاصل یک عبارت بتوان 2 نامتناهی است!

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الف) $y = \frac{3x+1}{x-2}$

$$R_f = \mathbb{R} - \{3\}$$

ب) $y = \frac{2x+1}{x+1}$

$$R_f = \mathbb{R} - \{1\}$$

2

10

$$Df \rightarrow \omega_n - n^2 - 2 \geq 0 \rightarrow n^2 - \omega_n + 2 \leq 0 \rightarrow 1 \leq n \leq 3$$

(9)

$$Df \cap Dg = \{1, 2, 3\}$$

$$\frac{f}{g} = h = \left\{ (1, 0), (2, \sqrt{\frac{2}{3}}), (3, 0) \right\}$$

(الف) $y = n^3 - 2n^2 + 2n - 1 + 1 = y = (n-1)^3 + 1$

(10)

$$y-1 = (n-1)^3 \rightarrow \sqrt[3]{y-1} = n-1 \rightarrow n = \sqrt[3]{y-1} + 1$$

$$R_f = \mathbb{R}$$

(ب) $y = \frac{1}{n^2 - 2n} \rightarrow n^2 y - 2ny = 1 \rightarrow n^2 y - 2ny - 1 = 0$

$y \neq 0 \rightarrow n = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y} \rightarrow 4y(y+1) \geq 0 \rightarrow \frac{-1}{+} \frac{0}{-} \frac{+}{+}$

$y = 0 \rightarrow 0 = 1 \times$ صحتی وجود ندارد! $\rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$