

سوال (۱)

$$f(n) = \sqrt{n+4}\sqrt{n-4} = \sqrt{(\sqrt{n-4} + 2)^2} \xrightarrow{n \geq 4} \sqrt{n-4} + 2$$

$$g(n) = \sqrt{n-4}\sqrt{n-4} = \sqrt{(\sqrt{n-4} - 2)^2} \xrightarrow{n \geq 4} \sqrt{n-4} - 2$$

$$g(n) + f(n) = 2\sqrt{n-4} = a + b\sqrt{n+c} \rightarrow a=0/b=2/c=-4 \Rightarrow \frac{a+b}{c} \rightarrow \frac{0+2}{-4} \rightarrow -\frac{1}{2} \quad \text{پ}$$

سوال (۲)

$$\frac{g(n)}{f(n)} \rightarrow n=2 \begin{cases} g(2)=1 \\ f(2)=-4 \end{cases} \rightarrow -\frac{1}{4} \quad n=1 \begin{cases} g(1)=0 \\ f(1)=\text{چون} \end{cases} \quad n=3 \begin{cases} g(3)=5 \\ f(3)=\frac{3+2}{9-12+4} = -\frac{5}{5} = -1 \end{cases} \quad n=0 \begin{cases} g(0)=4 \\ f(0)=\frac{4}{3} \end{cases} \rightarrow \frac{4}{3}$$

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

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

سوال (۳)

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

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

$$2g^2(n) + 1 = \left\{ (-2, 19), (1, 3), (3, 4), (-1, 1) \right\} \quad \text{پ}$$

$$\frac{2f}{g} = \left\{ (1, \frac{4}{-1}), (3, \frac{-2}{2}), (-1, \frac{12}{0}) \right\} \xrightarrow{\text{چون}} \frac{2f}{g} = \left\{ (1, -4), (3, -1) \right\}$$

سوال (۴)

$$2f + g \rightarrow \left\{ (2, 8), (-2, 4), (3, 5) \right\} \quad \text{پ}$$

$$Df(n) \rightarrow n \geq 0/\sqrt{3n} - n \geq 0 \rightarrow 3n \geq n^2 \rightarrow 3n - n^2 \geq 0 \rightarrow n(3-n) \geq 0 \rightarrow \frac{3}{1+1} \rightarrow n = [0, 3] / n \neq 2 \Rightarrow$$

$$Df(n) = [1, 3] - \{2\}$$

$$Dg(n) \rightarrow \begin{array}{c} \bullet \bullet \bullet \bullet \bullet \\ \bullet \bullet \bullet \bullet \bullet \end{array} \rightarrow \mathbb{R} \xrightarrow{g(n)+1 \neq 0 \rightarrow g(n) \neq -1} Dg(n)+1 = \mathbb{R} \\ Dg(n) = n \in \mathbb{Z}$$

$$Dg(n) \cap Df(n) \rightarrow [0, 3] - \{2\} \quad \text{پ}$$

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$$\frac{f(m)}{g(m)} = \left\{ \left(0, \frac{0}{3}\right), \left(2, \frac{\sqrt{2}}{2}\right), \left(4, \frac{0}{4}\right), \left(8, -1\right) \right\} \rightarrow \left\{ (1, 0), \left(2, \frac{\sqrt{2}}{2}\right), (4, 0) \right\}$$

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

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ب) $y^3 - 2y^2 + y - 1 = 0 \xrightarrow{\Delta_2} 4y^2 + 4y - 1 = 0 \rightarrow y^2 + y - \frac{1}{4} = 0 \rightarrow y(y+1) \rightarrow \frac{1}{+ \phi - \phi +} \rightarrow$

نفسه درج!

$$\text{Rf} = (-\infty, -1] \cup [0, \infty) \xrightarrow{y \neq 0} (-\infty, -1] \cup (0, \infty)$$

$$\text{الف) } x^2 - 4x + 1 = 0$$

$$\int \frac{b}{ra} = \frac{c}{r} \rightarrow 2 \quad \text{Rf} = [4, \infty)$$

$$c - a + 1 = 0 \rightarrow 4$$

$$\text{ب) } -x^2 + 4x + 3 = 0$$

$$\text{ext} \int \frac{b}{ra} = \frac{-4}{-2} \rightarrow 2 \quad \text{Rf} = (-\infty, 12]$$

$$-9 + 18 + 3 \rightarrow 12$$

$$\text{ج) } \sqrt{x^2 - 4x - 3} = 0$$

$$\text{ext} \int \frac{b}{ra} = \frac{c}{r} \rightarrow 2$$

$$c - a - 3 = 0 \rightarrow 5$$

$$\sqrt{[-5, +\infty)} = [0, +\infty)$$

$$[\sqrt{5}, \infty)$$

$$\text{د) } \sqrt{-x^2 + 4x} = 0$$

$$\text{ext} \int \frac{b}{ra} \rightarrow \frac{-4}{-2} \rightarrow 2$$

$$-9 + 18 \rightarrow 9$$

$$[0, +3]$$

$$\text{الف) } \mathbb{R}$$

$$\mathbb{R}$$

$$\sqrt{\mathbb{R}} \rightarrow [0, \infty)$$

$$[0, \infty)$$

(٩)

$$\text{الف) } y = \frac{x+1}{x-2}$$

$$\text{Rf} = \mathbb{R} - \left\{ \frac{1}{2} \right\}$$

$$\text{ب) } y = \frac{x+1}{x+1}$$

$$\text{Rf} = \mathbb{R} - \left\{ 1 \right\}$$

(١٠)

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

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

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

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

الف - ١) $y = n^2 - 2n + 1 \rightarrow \min \begin{cases} n = \frac{x}{2} = 1 \\ y = 1 - 2 + 1 = 0 \end{cases} \rightarrow R_f = [0, +\infty)$

ب - ١) $y = -n^2 + 4n + 3 \rightarrow \max \begin{cases} n = \frac{-4}{-2} = 2 \\ y = -9 + 16 + 3 = 10 \end{cases} \rightarrow R_f = (-\infty, 10]$

ج - ١) $y = n^2 - 2n - 3 \rightarrow \min \begin{cases} n = \frac{x}{2} = 1 \\ y = 1 - 2 - 3 = -4 \end{cases} \rightarrow R_f = \sqrt{[-4, +\infty)} = [0, +\infty)$

د - ١) $y = 4n - n^2 \rightarrow \max \begin{cases} n = \frac{-4}{-2} = 2 \\ y = 16 - 4 = 12 \end{cases} \rightarrow R_f = \sqrt{(-\infty, 12]} = [0, 3]$

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

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

$R_f = \mathbb{R}$

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

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

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