

$$(f(x) + g(x))^2 = x + \varepsilon \sqrt{x - \varepsilon} + x - \varepsilon \sqrt{x - \varepsilon} + 2\sqrt{x^2 - 16x + 6\varepsilon} = 2x + 2|x - 8| = 2x + 2x - 16 = 4x - 16 = 4(x - 4) \xrightarrow{\text{پس}} f(x) + g(x) = 2\sqrt{x - 4} \Rightarrow$$

$$\begin{cases} a = 0 \\ b = 2 \\ c = -4 \end{cases} \Rightarrow \frac{0+2}{-4} = \boxed{-\frac{1}{2}} \quad \text{پ}$$

$$D_{f(x)} = \mathbb{R} - \{1, 3\} \rightarrow x^2 - \varepsilon x + 3 \neq 0 \Rightarrow (x-1)(x-3) \neq 0 \Rightarrow D_f = \mathbb{R} - \{1, 3\}$$

$$\Rightarrow \frac{g}{f} = \left\{ (2, 1), (0, 4) \right\} \quad D_f = \mathbb{R} - \{1, 3\} \quad (x^2 - \varepsilon x + 3 \neq 0 \rightarrow x \neq 1, 3)$$

ارتاق

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

الف) $\left\{ (1, \frac{1}{4}), (2, \frac{3}{4}), (3, 1), (4, \frac{5}{4}) \right\} = f(2x)$

ب) $\left\{ (1, 2), (2, 1), (3, 0), (4, -1), (5, -2), (6, -3), (7, -4), (8, -5) \right\} = f(x^2)$

ج) $\left\{ (-2, 19), (1, 3), (3, 9), (4, 16) \right\}$

د) $\left\{ (1, -4), (3, -1), (-1, \frac{1}{4}), (-3, \frac{9}{4}) \right\} = \left\{ (1, -4), (3, -1) \right\}$

$$2 \neq \left\{ (2, 2), (3, 2), (4, 18), (-2, 0) \right\} \Rightarrow$$

$$2 \neq + g = \left\{ (2, 5), (-2, 6), (3, 5) \right\}$$

$$D_{f(x)} \rightarrow \begin{cases} x \neq 2 \\ x \geq 0 \\ x \leq 2 \end{cases} \Rightarrow D_f = [0, 2] - \{2\} \quad D_{g(x)} \rightarrow \begin{cases} x \in \mathbb{Z} \Rightarrow g(x) = 0 \\ x \notin \mathbb{Z} \Rightarrow g(x) = -1 \end{cases} \Rightarrow D_g = \mathbb{R}$$

$h(x) = \left(\frac{f}{g+1}\right)(x) \Rightarrow D_h = D_f \cap D_g \cap \{x \in D_g \mid (g+1)(x) \neq 0\} \Rightarrow D_h = [0, 2] - \{2\} \cup \{1, 5\}$

۱، ۵

$$D_h = [0, 2] - \{2\} \cup \{1, 5\} \rightarrow D_h = \{0, 1, 5\}$$

$$-x^2 + 5x - 4 \geq 0 \Rightarrow -(x^2 - 5x + 4) \geq 0 \Rightarrow -(x-1)(x-4) \geq 0 \Rightarrow$$

$$(x-1)(x-4) \leq 0 \rightarrow \frac{1}{x-1} - \frac{1}{x-4} \geq 0 \Rightarrow D_f = [1, 4] \Rightarrow$$

$$h(x) = \left\{ \left(\frac{1}{x-1}, \frac{1}{x-4} \right) \right\}$$

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

دقت کن!

۱۵

الف) $R_f = \mathbb{R}$ | برد باید بار دست اصفی معالیه شود!

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

$\Rightarrow 4y(y+1) \geq 0 \Rightarrow \begin{cases} 4y \geq 0 \Rightarrow y \geq 0 \\ (y+1) \geq 0 \Rightarrow y \geq -1 \end{cases} \Rightarrow R_f = [0, +\infty)$

الف) $y_{min} = \frac{-\Delta}{4a} = \frac{-(12 - 4(1))}{4} = \frac{2}{4} = \frac{1}{2} \Rightarrow R_f = [\frac{1}{2}, +\infty)$

ب) $y_{max} = \frac{-\Delta}{4a} = \frac{-(12 - 4(-3))}{4} = \frac{-24}{4} = -6 \Rightarrow R_f = (-\infty, -6]$

ج) $y_{min} = \frac{-\Delta}{4a} = \frac{-(12 - 4(-3))}{4} = \frac{-24}{4} = -6 \Rightarrow R_f = [-6, +\infty)$

د) $y_{max} = \frac{-\Delta}{4a} = \frac{-12}{4} = -3 \Rightarrow R_f = (-\infty, -3]$

الف) $R_f = \mathbb{R}$

ب) $R_f = \mathbb{R}$

ج) $R_f = [0, +\infty)$

د) $R_f = [0, +\infty)$

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

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

$$f(n) = \frac{\sqrt{\sqrt{3n} - n}}{n-2} \rightarrow \begin{cases} n \neq 2 \\ n \geq 0 \end{cases} (\sqrt{3n}) \rightarrow D_f = [0, 3] - \{2\} \quad (5)$$

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

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

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

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

$$D_f \rightarrow \sqrt{3n} - n \geq 0 \rightarrow n^2 - 3n + 2 \leq 0 \rightarrow 1 \leq n \leq 2 \quad (9)$$

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

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

$$(الف) \quad y = n^3 - 3n^2 + 2n - 1 + 1 = y = (n-1)^3 + 1 \quad (10)$$

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

$$R_f = \mathbb{R}$$

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

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

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