

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

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

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

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

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الف)  $\left\{ \left( \frac{1}{4}, 2 \right), \left( \frac{3}{4}, -1 \right), (2, 3), \left( -\frac{1}{4}, 6 \right) \right\} = f(2x)$

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

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

د)  $\left\{ (1, -4), (3, -1), \left( -\frac{1}{2}, \frac{5}{2} \right) \right\} = \left\{ (1, -4), (3, -1) \right\}$

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

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

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

$$h(x) = \left( \frac{f}{g+1} \right)(x) \Rightarrow D_h = D_f \cap D_g \cap \{x \in D_g \mid (g+1)(x) \neq 0\} \Rightarrow D_h = [0, 2] - \{1, 2, 3, 5\}$$

$$-n^2 + 2n - 1 \geq 0 \Rightarrow -(n^2 - 2n + 1) \geq 0 \Rightarrow -(n-1)(n-1) \geq 0 \Rightarrow$$

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

$$h(n) = \{(1, 2), (2, 2), (3, 2)\}$$

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الف)  $R_f = \mathbb{R}$

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

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

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الف)  $y_{\min} = \frac{-\Delta}{f_a} = \frac{-(14 - f(1))}{f} = \frac{2}{f} = 2 \Rightarrow R_f = [2, +\infty)$

ب)  $y_{\max} = \frac{-\Delta}{f_a} = \frac{f(14 - f(-3))}{f} = 12 \Rightarrow R_f = (-\infty, 12]$

ج)  $y_{\min} = \frac{-\Delta}{f_a} = \frac{-(14 - f(-3))}{f} = -\frac{r_n}{f} = -1 \Rightarrow R_f = [-1, +\infty) = [0, +\infty)$

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د)  $y_{\max} = \frac{-\Delta}{f_a} = \frac{-r_n}{-f} = 9 \Rightarrow R_f = \sqrt{(-\infty, 9]} = [0, 3]$

الف)  $R_f = \mathbb{R}$

ب)  $R_f = \mathbb{R}$

ج)  $R_f = [0, +\infty)$

د)  $R_f = [0, +\infty)$

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

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

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