

با دقت راه حل مشاهده شود! ۱۴, ۲۵

$$f(n) = \sqrt{x-2+2\sqrt{n-2}+2} = \sqrt{(\sqrt{n-2}+2)^2} = |\sqrt{n-2}+2| = \sqrt{n-2}+2$$

$$g(n) = \sqrt{x-2-2\sqrt{n-2}+2} = \sqrt{(\sqrt{n-2}-2)^2} = |\sqrt{n-2}-2| \xrightarrow{n \geq 8} \sqrt{n-2}-2$$

$$f(n)+g(n) = \sqrt{n-2}+2+\sqrt{n-2}-2 = 2\sqrt{n-2} \xrightarrow{\begin{matrix} a=0 \\ b=2 \\ c=-2 \end{matrix}} \frac{a+b}{c} = \frac{2}{-2} = -1$$

$$f(x) = \frac{x+2}{(x-1)(x-2)}$$

$$f(2) = -2 \rightarrow \frac{g(2)}{f(2)} = -\frac{1}{2}$$

$$f(0) = \frac{2}{-2} \rightarrow \frac{g(0)}{f(0)} = 1$$

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

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

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

ج) $g(1)+1 \Rightarrow 2(-1)+1 = -1 = \left\{ (-\sqrt{2}, 0), (-1, -1), (\sqrt{2}, 0) \right\}$

د) $x=1, 2, -1$
 $x=1 \rightarrow \frac{f(1)}{-1} = -2 \quad x=2 \rightarrow \frac{f(2)}{2} = -1 \quad x=-1 \rightarrow \frac{f(-1)}{1} = 1 \quad = \left\{ (1, -2), (2, -1), (-1, 1) \right\}$

$x=2, 3, -1$ مورد

$h(2) = 2(2)+2 = 6$

$h(3) = 2(3)+2 = 8$

$h(-1) = 2(-1)+2 = 0$

$h = \left\{ (2, 6), (3, 8), (-1, 0) \right\}$

$\sqrt{x^2-n^2} > 0 \rightarrow 0 < n \leq 3 \xrightarrow{n \in \mathbb{Z}} 0, 1, 2, 3 \in g(n)$
 $n \neq 2$

$D = \left\{ 0, 1, 3 \right\}$

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

$$\{x-2)(x-1) \leq 0$$

$$\begin{array}{|c|} \hline x \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 2 \\ \hline \end{array} \rightarrow [1, 2]$$

$$h(x) = \{(1, 0), (2, 0), (x, f(x))\}$$

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

1, 1.5

$$\text{الف) } \rightarrow \text{درم مناسبت } R = \mathbb{R}$$

ردس اصل!

1.25

$$\text{الف) } x^2 - 4x + 1 \rightarrow (x-2)^2 + 4 \quad R_f = [4, +\infty)$$

$$\text{ب) } -(x-3)^2 + 12 \rightarrow R_f = (-\infty, 12]$$

$$\text{ج) } R_f = [0, \infty) \quad \text{! اصل}$$

$$\text{د) } 9x - x^2 = 1 \rightarrow x^2 - 9x = -1 \rightarrow x^2 - 9x + 1/4 = 1/4 + 1 \rightarrow x^2 - 9x + 1/4 = (x - 9/2)^2 + 1/4 \rightarrow R_f = \sqrt{(-\infty, 9]} = [-0.3]$$

1, 25

$$\text{الف) } = \mathbb{R}$$

$$\text{ب) } = \mathbb{R}$$

$$\text{ج) } [0, +\infty)$$

$$\text{د) } \sqrt{x} = [0, +\infty)$$

$$\text{الف) } R = \mathbb{R} - \{x\}$$

$$\text{ب) } R = \{x\}$$

$$f(x) = \left\{ \left(\frac{1}{x}, 2\right), \left(\frac{x}{2}, -1\right), (2, 2), \left(-\frac{1}{x}, 4\right) \right\} \quad x \text{ های } f \text{ باید حتماً برابر ۲ شوند!} \quad (۳)$$

$$f(x) = \left\{ (1, 2), (-1, 2), (\sqrt{x}, -1), (-\sqrt{x}, -1), (2, 2), (-2, 2) \right\} \quad \text{هر کدام از } x \text{ های } f \text{ را برابر } x^2 \text{ قرار دهیم!}$$

$$g^2(x) + 1 = \left\{ (-2, 19), (1, 3), (3, 9), (-1, 1) \right\} \quad \text{این عمل روی } y \text{ های } g \text{ اعمال می‌شود:}$$

$$\frac{xf}{g} = \left\{ \left(1, \frac{2 \times 2}{-1}\right), \left(3, \frac{2 \times -1}{2}\right), \left(-1, \frac{2 \times 4}{-2}\right) \right\} = \left\{ (1, -2), (3, -1) \right\}$$

$$Df \rightarrow 5n - n^2 - 2 \geq 0 \rightarrow n^2 - 5n + 2 \leq 0 \rightarrow 1 \leq n \leq 4 \quad (۶)$$

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

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

$$\text{الف) } y = n^3 - 2n^2 + 3n - 1 + 1 = y = (n-1)^3 + 1 \quad (۷)$$

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

$$Rf = \mathbb{R}$$

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

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

$$\xrightarrow{y=0} 0 = 1 \quad x \text{ حقیقی وجود ندارد!} \rightarrow Rf = (-\infty, -1] \cup (0, +\infty)$$

$$\text{الف - ٨) } y = x^2 - 2x + 1 \rightarrow \min \left| \begin{array}{l} x = \frac{2}{2} = 1 \\ y = 1 - 2 + 1 = 0 \end{array} \right. \rightarrow R_f = [0, +\infty)$$

$$\text{ب - ٨) } y = -x^2 + 4x + 3 \rightarrow \max \left| \begin{array}{l} x = \frac{-4}{-2} = 2 \\ y = -9 + 18 + 3 = 12 \end{array} \right. \rightarrow R_f = (-\infty, 12]$$

$$\text{ج - ٨) } y = x^2 - 2x - 3 \rightarrow \min \left| \begin{array}{l} x = \frac{2}{2} = 1 \\ y = 1 - 2 - 3 = -4 \end{array} \right. \rightarrow R_f = \sqrt{[-4, +\infty)} = [-4, +\infty)$$

$$\text{د - ٨) } y = 4x - x^2 \rightarrow \max \left| \begin{array}{l} x = \frac{-4}{-2} = 2 \\ y = 18 - 9 = 9 \end{array} \right. \rightarrow R_f = \sqrt{(-\infty, 9]} = (-\infty, 9]$$