

۱۷,۵

نام و نام خانوادگی: (محل امضا و مهر) پاسخنامه تشریحی تکلیف شماره کلاس: آزمون:	$f(x) = \sqrt{x+2} \sqrt{x-2} + g(x) = \sqrt{x+2} \sqrt{x-2} = A \Rightarrow x-2 = 4$ $\Rightarrow A^2 = x+2 + \sqrt{x^2-4} = x+2 + \sqrt{(x-2)^2} = x+2 + x-2 = 4x-4 = A^2$ $\Rightarrow A = \sqrt{4x-4} = 2\sqrt{x-1} \Rightarrow a+b=2, c=-2$ $\Rightarrow \frac{a+b}{c} = \frac{2}{-2} = -1$	$f(x) = \frac{x+2}{x^2-4x+5}, g(x) = \{(2,1), (1,0), (3,5), (0,2)\}$ $\frac{g}{f} = \{(2, -\frac{1}{2}), (0, 4)\}$ ۱,۷۵ $f(x) = \frac{x+2}{(x-1)(x-5)} \Rightarrow f(1) = \infty, f(5) = -\frac{2}{4} = -\frac{1}{2} \Rightarrow \frac{g}{f} = \left\{ \frac{1}{-\frac{1}{2}}, \frac{2}{\frac{1}{2}} \right\}$ $\frac{g}{f} = \left\{ -2, 4 \right\}$ زیر سبب!	$f(x) = \{(1,2), (2,-1), (3,4), (4,-1)\}$ $g(x) = \{(2,5), (1,-1), (3,2), (4,-1)\}$ $f(x) = \left\{ \left(\frac{1}{2}, 2\right), \left(\frac{2}{3}, -1\right), \left(\frac{3}{4}, 4\right), \left(\frac{4}{5}, -1\right) \right\}$ ۲ $f(x^2) = \left\{ \left(\pm 1, 2\right), \left(\pm \sqrt{2}, -1\right), \left(\pm \sqrt{3}, 4\right), \left(\pm 2, -1\right) \right\}$ $2g^2(x)+1 = \{(2, 19), (1, 3), (3, 9), (-1, 3)\}$ ۳ $2g^2(x)+1 = \{(1, 9), (2, 3), (3, 9), (4, 3)\}$ ۱,۵ $\frac{2f}{g} = \{(1, -2), (2, -1), (3, -\frac{1}{2}), (4, -\frac{1}{4})\}$ ۴	$f(x) = \{(2,1), (3,1), (4,9), (-2,0)\}$ $g(x) = \{(1,1), (2,4), (-2,4), (-1,2), (3,2)\}$ $h = 2f+g = \{(2, 3), (3, 5), (-2, 4)\}$ ۵	آرژمنت ثابت مقرب من $f(x) = \frac{\sqrt{5x} - x}{x-2}, g(x) = [x] + [-x]$ ۱,۵ $\Rightarrow [x] + [-x] \neq -1 \Rightarrow x \leq 2, x-2 \neq 0 \Rightarrow x \neq 2$ $\sqrt{5x} \geq 0 \Rightarrow x \geq 0, \sqrt{5x} - x \geq 0 \Rightarrow 0 \leq x \leq 5 \Rightarrow \bigcap = \bigcap = 0 \leq x \leq 5$ $D \frac{f}{g+1} = \{0, 1, 2, 3, 4, 5\}$ ۶
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صورت سوال را غلط نوشتی!

الف) $f(x) = \sqrt{x^2 - 4}$, $g(x) = \{(1, 0), (2, 0), (4, 0), (9, 0)\}$ $\Rightarrow f(x) = \{(1, 0), (2, 0), (4, 0), (9, 0)\}$ $\nrightarrow x^2 - 4 \geq 0$ $\Rightarrow \frac{f(x)}{g(x)} = \{(1, 0), (2, 0), (4, 0), (9, 0)\}$ $1 \leq x \leq 1$ $\nrightarrow \frac{f}{g} = \{(1, 0), (2, 0), (4, 0), (9, 0)\}$ ① افراد	6
الف) $y = x^3 - 2x^2 + 2x \Rightarrow y = (x-1)^2 + 1 \Rightarrow y-1 = (x-1)^2$ $\Rightarrow \sqrt{y-1} = x-1 \Rightarrow x = \sqrt{y-1} + 1 \Rightarrow R_f = \mathbb{R}$ (1, 0) y ≠ 0 (با این شرط درجه 2 فرض شد!) $\Rightarrow y = \frac{x^2 - 2x}{x^2 - 2x} \Rightarrow yx^2 - 2yx = 0 \Rightarrow yx^2 - 2yx - 1 = 0$ $\Rightarrow \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{2y \pm \sqrt{4y^2 - 4y}}{2y} \Rightarrow 2y^2 - 4y \geq 0 \Rightarrow y \leq -1 \vee y \geq 0 \Rightarrow y = 0 \Rightarrow -1 \Rightarrow R_f = \mathbb{R} - (-1, 0]$	7
الف) $y = x^2 - 4x + 10$ $\Rightarrow \text{ext} \left \frac{1}{4} \right \Rightarrow R_f = [4, +\infty)$ $\Rightarrow -x^2 + 4x + 10 = y$ $\text{ext} \left \frac{1}{4} \right \Rightarrow R_f = (-\infty, 14]$ $\Rightarrow y = \sqrt{x^2 - 4x - 10} \Rightarrow \text{ext} \left \frac{1}{4} \right \Rightarrow R_f = [-10, +\infty)$ $\Rightarrow y = \sqrt{-x^2 + 4x} = y \text{ ext} \left \frac{1}{4} \right \Rightarrow R_f = [-10, 9] = (-\infty, 9]$	8
الف) $y = x^3 - 3x^2 + 2x + 1 \Rightarrow R_f = \mathbb{R}$ $\Rightarrow y = x^3 - 3x^2 + 2x + 1 \Rightarrow R_f = \mathbb{R}$ $\Rightarrow y = \sqrt{x^3 - 3x^2 + 2x + 1} \Rightarrow R_f = \sqrt{\mathbb{R}} = [0, +\infty)$ $\Rightarrow y = (x^3 - 3x^2 + 2x + 1)^2 \Rightarrow R_f = [0, +\infty)$	9
الف) $y = \frac{x+1}{x-2}$ $R_f = \mathbb{R} - \{2\}$ $\Rightarrow y = \frac{x+1}{x+1}$ $\Rightarrow R_f = \mathbb{R} - \{1\}$	10

$$Df = \mathbb{R} - \{1, 3\} \quad (x^2 - 4x + 3 \neq 0 \rightarrow x \neq 1, 3) \quad (2)$$

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

$$f(x) = \left\{ \left(\frac{1}{x}, 2\right), \left(\frac{x}{2}, -1\right), (2, 2), \left(-\frac{1}{x}, 4\right) \right\} \quad x \text{ های } f \text{ باید متباین باشند!} \quad (3)$$

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

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

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

$$f(x) = \frac{\sqrt{\sqrt{3x} - x}}{x - 2} \rightarrow \begin{cases} x \neq 2 \\ x \geq 0 \end{cases} \quad \begin{cases} \sqrt{3x} \\ \sqrt{3x} - x \geq 0 \end{cases} \rightarrow \begin{cases} \sqrt{3x} \\ 3x \geq x^2 \end{cases} \rightarrow \begin{cases} x \geq 0 \\ 0 \leq x \leq 3 \end{cases} \rightarrow Df = [0, 3] - \{2\} \quad (4)$$

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

$$D \frac{f}{g+1} = \left\{ Df \cap Dg, g(x) \neq -1 \right\} = \left\{ 0, 1, 3 \right\}$$

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

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

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

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

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

(v)

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

$\mathcal{R}_f = \mathbb{R}$

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

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

$y = 0 \rightarrow 0 = 1 \times$ صفتی وجود ندارد! $\rightarrow \mathcal{R}_f = (-\infty, -1] \cup (0, +\infty)$