



۲. آزمون های نوشتاری

۱- $(f+g)' = f' + g' + f'g$

$f' + g' = (x + \sqrt{x-4}) + (x - \sqrt{x-4}) = 2x$

$f'g = \sqrt{(x+4)\sqrt{x-4}} \cdot \sqrt{(x-4)\sqrt{x-4}} = \sqrt{x^2 - 14(x-4)} = \sqrt{x^2 - 14x + 56} = \sqrt{(x-1)^2} \xrightarrow{x \geq 1} x-1$

$(f+g)' = 2x + (x-1) = 3x-1 \Rightarrow f+g = \frac{3}{2}x - \frac{1}{2} \Rightarrow a+b, c \Rightarrow \frac{a+b}{c} = \frac{1}{2}$

۲- $f(x) = \frac{x+2}{(x-1)(x-3)}$

جوابی → $\begin{cases} 2 \rightarrow \frac{2+2}{1 \cdot (-1)} = -4 \\ 1 \rightarrow \frac{1+2}{0 \cdot (-3)} \rightarrow \infty \\ 3 \rightarrow \frac{3+2}{3 \cdot 0} \rightarrow \infty \\ 0 \rightarrow \frac{0+2}{(-1) \cdot (-3)} = \frac{2}{3} \end{cases}$

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

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

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

ج) $3g^2(x) + 1 = \left\{ (-2, 18), (1, 4), (3, 13), (-1, 1) \right\}$

$3x(2)^2 + 1 = 13$

$3x(-1)^2 + 1 = 4$

$3x(2)^2 + 1 = 13$

$3x(0)^2 + 1 = 1$

د) $\frac{2f}{g} = \left\{ (1, 4), (3, -1), \left(-1, \frac{13}{0} \right) \right\}$

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$2f+g = \left\{ (2, 5), (3, 5), (-2, 4) \right\}$

$5 - \sqrt{3x} - x \geq 0 \rightarrow \sqrt{3x} - x \geq 0 \rightarrow \sqrt{3x} \geq x \rightarrow 3x \geq x^2 \rightarrow 0 \geq x^2 - 3x \rightarrow 0 \geq x(x-3)$

$x \in [0, 3], x \neq 2$

↖ خط مجز

$[x] + [-x] \xrightarrow{\text{باید صمغ شود}} \frac{f(x)}{g(x)+1} = \left\{ (0, 0), \left(1, \frac{\sqrt{3}-1}{-1} \right), (3, 0) \right\}$

۵- $5x - x^2 - 4 \geq 0 \rightarrow -(x^2 - 5x + 4) \geq 0 \rightarrow -(x-1)(x-4) \geq 0 \rightarrow x \in [1, 4]$

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

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الف) $4 \in (x^3 - 3x^2 + 3x - 1) + 1 \rightarrow 4 \in (x-1)^3 + 1 \rightarrow 4 - 1 \in (x-1)^3 \rightarrow \sqrt[3]{4-1} \in x-1$
 $\rightarrow x \in \sqrt[3]{4-1} + 1 \rightarrow R_F \in R$

ب) $4 \in \frac{1}{x^2 - 4x} \rightarrow 4x^2 - 4x \in 1 \rightarrow 4x^2 - 4x - 1 \geq 0 \rightarrow \Delta \geq 0 \rightarrow (-4)^2 - 4(4)(-1) \geq 0$
 $\rightarrow 16 + 16 \geq 0 \rightarrow 32 \geq 0 \rightarrow 4^2 + 4 \geq 0 \rightarrow 4(4+1) \geq 0 \rightarrow \frac{-1 \pm \sqrt{1+4}}{2} \rightarrow R_F \in (-\infty, -1] \cup (0, +\infty)$

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الف) $\begin{cases} x \in \frac{-b}{2a} \in \frac{F}{2} \in \mathbb{R} \\ 4 \in (x)^2 - 4(x) + 10 \in \mathbb{R} \end{cases} \rightarrow R_F \in [4, +\infty)$

ب) $\begin{cases} x \in \frac{-9}{-2} \in \mathbb{R} \\ 4 \in -(x)^2 + 9(x) + 13 \in \mathbb{R} \end{cases} \rightarrow R_F \in (-\infty, 12]$

ج) $\begin{cases} x \in \frac{F}{2} \in \mathbb{R} \\ 4 \in F - 1 - 3x - 11 \end{cases} \xrightarrow{\text{زیر ادبیات}} R_F \in [0, +\infty)$

د) $\begin{cases} x \in \frac{-9}{-2} \in \mathbb{R} \\ 4 \in -9 + 11 \in \mathbb{R} \end{cases} \xrightarrow{\text{زیر ادبیات}} R_F \in [0, 13]$

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الف) $R_F \in R$

ب) $R_F \in R$

ج) $R_F \in [0, +\infty)$

د) $R_F \in R$

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الف) $R_F \in R - \{3\}$

ب) $R_F \in R - \{2\}$