

۲۰ آفرین !!

$$f(x) \rightarrow \log_2^{(x-1)} \geq 0 \rightarrow x-1 \geq 1 \rightarrow x \geq 2, x-1 \geq 0 \rightarrow x \geq 1$$

$$g(x) \rightarrow -(x'-2)^2 \geq 0 \rightarrow x'=2 \rightarrow \sqrt{\log_2^{x-1}} = 2 \rightarrow \log_2^{x-1} = 4 \rightarrow x-1 = 16 \rightarrow x = 17$$

$$\rightarrow \textcircled{1} \cap \textcircled{2} \cap \textcircled{3} \rightarrow D_{g \circ f} = \{17\} \checkmark$$

$$f \circ g(x) = 2(x^2 - 2x + 1) - 5 = 2x^2 - 4x + 11$$

$$g \circ f(x) = (2x - 5)^2 - 3(2x - 5) + 11 = 4x^2 - 20x + 25 - 6x + 15 + 11 = 4x^2 - 26x + 51$$

$$\rightarrow 2x^2 - 4x + 11 = 4x^2 - 26x + 51 \rightarrow 2x^2 - 20x + 40 = 0 \rightarrow x^2 - 10x + 20 = 0 \rightarrow x = 5 \pm \sqrt{5} = 5 \pm 2.236 = 7.236, 2.764$$

$$g \circ f(x) = g(f(x)) = g(2x) = 5x^2 + 11 \rightarrow g(x) = \frac{5}{2}x^2 + 11 \rightarrow g(x-1) \text{ با } g(x) \text{ کمترین مقدار قدری ندارد}$$

$$\rightarrow g(x)_{\min} \rightarrow \text{cut} = \frac{b}{2a} = 0 \rightarrow g(0) = 11 \rightarrow g(x-1)_{\min} = \begin{vmatrix} 11 \\ 11 \end{vmatrix} \checkmark$$

$$f(g(x)) = \dots \rightarrow f(g(x)) = y \rightarrow f(x) = 2x - 5 \rightarrow f(y) = 2y - 5 = 2x^2 - 4x - 1$$

$$\rightarrow 2y = 2x^2 - 4x + 3 \rightarrow y = g(x) = x^2 - 2x + 1 = (x-1)^2$$

$$\rightarrow g \circ f(x) = (2x - 5)^2 - 3(2x - 5) + 11 \checkmark$$

$$f - g = 5 - x, 3f - 2g = 12 \rightarrow \begin{matrix} 3f - 2g = 12 \\ -2f + 2g = 2x - 10 \end{matrix}$$

$$f = 2x + 5 \rightarrow 2x + 5 - g = 5 - x \rightarrow g = 2x - 1$$

$$\rightarrow f \circ g = 2(2x - 1) + 5 = 4x - 2 + 5 = 4x + 3 \rightarrow 4x + 3 = 0 \rightarrow x = -\frac{3}{4} = -0.75 \checkmark$$

$$g \circ f = \log_9^9 = \log_9^9 = 9$$

$$f \circ g = 9^{\log_9^9} = 9^9 = 9^9$$

$$\Rightarrow 9^9 \geq 9^9 \rightarrow 9^9 - 9^9 \leq 0 \rightarrow 9(9-9) \leq 0$$

$$\frac{0}{1-1} = \frac{0}{0}$$

$$x \in [0, 9]$$

$$x = \{0, 9\}$$

$$x = \{0, 9\}$$

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$$f\left(9 - \frac{9}{9}\right) = 9^9 - 9 + \frac{9}{9} + 9 - \frac{9}{9} = \left(9 - \frac{9}{9}\right)^9 + 9 - \frac{9}{9} \Rightarrow f(9) = 9^9 + 9$$

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$$f \circ g \rightarrow \log_9^9 \rightarrow D_{f \circ g} \rightarrow 9(9-9) > 0 \rightarrow 9^9 \cdot 9 < 0 \rightarrow \frac{0}{1-1} = \frac{0}{0}$$

$$\rightarrow D_f = (0, 9) \rightarrow \log_9^9 \rightarrow f \circ g(x_{max}) = \max \rightarrow D_{min} = \frac{0}{1-1} \rightarrow R_{min} = -\infty$$

$$D_{max} = g(9) = 9 \rightarrow R_{max} = \log_9^9 = 9 \rightarrow R = (-\infty, 9] \rightarrow \text{ANS} = \{1, 9, 9, 9\} \rightarrow \text{مكرر}$$

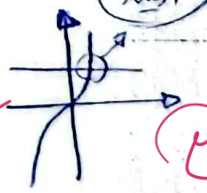
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$$f(f(x)) = 1 - 9^9 \rightarrow f(f(x)) = t \rightarrow f(t) = 1 - 9^9 \rightarrow f(x) = 1 - 9^9$$

$$h(g(x)) = (x-1)^9 + 9(x-1) + 1 = x^9 - 9x^8 + 9x^7 - \dots + 9x - 1 + 1 = x^9 - 9x^8 + 9x^7 - \dots + 9x - 1$$

$$\rightarrow x^9 - 9x^8 + 9x^7 = 1 \rightarrow x^9 - 9x^8 + 9x^7 - 1 = 0$$

$$\rightarrow x^9 - 9x^8 + 9x^7 - 1 = 0$$



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$$f(x) = x - \frac{9}{9} = x - 1 \rightarrow f(x) = 9 \rightarrow x - \frac{9}{9} = 9 \rightarrow x - 1 = 9 \rightarrow x = 10, x = 9$$

$$g \circ f(-1) = -a - 9 = 1 \rightarrow a = -10$$

$$a = -10$$

$$g \circ f(9) = 4 \cdot 9 + 1 = 37 \rightarrow a = 0$$

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