

پایه صفر

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سوال ①

$$g(x) = \sqrt{-x^2 + 3x - 2}, \quad f(x) = \sqrt{\log_4(x-1)}$$

$$D_{g \circ f} = ?$$

$$D_{g \circ f} = \{x \in D_f \mid f(x) \in D_g\} \quad x \in D_f \rightarrow \textcircled{I} x-1 > 0 \Rightarrow x > 1$$

$$\textcircled{II} \log_4(x-1) \geq 0 \Rightarrow x-1 \geq 1 \Rightarrow x \geq 2 \xrightarrow{\textcircled{I} \cap \textcircled{II}} [2, +\infty) \in x$$

$$f(x) \in D_g \rightarrow D_g = \sqrt{-(x-2)^2} \Rightarrow x-2 = 0 \Rightarrow x = 2 \rightarrow D_g = \{2\}$$

$$\Rightarrow \sqrt{\log_4(x-1)} = 2 \rightarrow \log_4(x-1) = 4 \Rightarrow x-1 = 16 \Rightarrow x = 17$$

$$D_{f \circ g} = \{17\} \cap [2, +\infty) \rightarrow D_{f \circ g} = \{17\}$$

$$g \circ f(x) = 5x^2 + 11 \Rightarrow g(2x) = 5x^2 + 11$$

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سوال ③

$$g(x-2) = 5(x-2)^2 + 11 = 5x^2 - 20x + 21$$

$$\begin{cases} f - g = -x + 5, \text{ با توجه به } f(x) = x^2 + x - 4 \text{ و } g(x) = 3x^2 - 3x + 15 \\ 2g(x) - 3f(x) = -14 \end{cases}$$

$$\xrightarrow{\text{حل دستگاه}} f(x) = 2x + 4$$

$$\Rightarrow -g(x) = -3x + 1 \Rightarrow g(x) = 3x - 1$$

$$f \circ g(x) = 2(3x - 1) + 4 = 6x + 2 \xrightarrow{\text{برای بدست آمدن } x} 6x + 2 = 0 \Rightarrow x = a = -\frac{1}{3}$$

$$f\left(\frac{x^2-2}{x}\right) = x^2 + x - 4 - \frac{2}{x} + \frac{2}{x^2} \Rightarrow f(x) = 9$$

سوال ⑦

$$f\left(x - \frac{2}{x}\right) = \left(x - \frac{2}{x}\right) + \left(x^2 + \frac{2}{x} - 4\right) = \left(x - \frac{2}{x}\right) + \left(x - \frac{2}{x}\right)^2$$

$$x - \frac{2}{x} = t \rightarrow f(t) = t + t^2 \xrightarrow{t=x} \boxed{f(x) = x^2 + x}$$