

$D_{g \circ f} = \{x \in D_f, f(x) \in D_g\}$ $f(x): x-1 > 0 \rightarrow x > 1 \quad \log_y^{(x-1)} \geq 0 \rightarrow x-1 \geq 1 \rightarrow x \geq 2 \quad D_f = [2, +\infty)$ $g(x): -x^2 + 4x - 4 \geq 0 \rightarrow x^2 - 4x + 4 \leq 0 \rightarrow (x-2)^2 \leq 0 \rightarrow x = 2 \quad D_g = \{2\}$ $D_{g \circ f} = \{x \in [2, +\infty), \sqrt{\log_y^{(x-1)}} = 2\} = \{17\}$	۱
$f \circ g(x) = f(g(x)) = f(x^2 - 4x + 4) = 2x^2 - 4x + 11$ $g \circ f(x) = g(f(x)) = g(2x - 5) = (2x - 5)^2 - 3(2x - 5) + 1 = 4x^2 - 24x + 41$ $f \circ g(x) = g \circ f(x) \rightarrow 2x^2 - 4x + 11 = 4x^2 - 24x + 41 \rightarrow 2x^2 - 20x + 30 = 0$ $\alpha^2 + \beta^2 = 5^2 - 2P = (10)^2 - 3V = 43$	۲
$g(2x) = 2x^2 + 11 \rightarrow 2x = t \rightarrow x = \frac{t}{2} \rightarrow g(t) = 2 \times \frac{t^2}{4} + 11 = \frac{1}{2}t^2 + 11$ $g(x) = \frac{1}{2}t^2 + 11 \rightarrow g(t+v) = \frac{1}{2}(t+v)^2 + 11$ $x - v = t \rightarrow x = t + v$ $y_s = 11$	۳
$f(g(x)) = 3g - 4 = 3x^2 - 4x - 1 \rightarrow g = x^2 - 2x + 1$ $g \circ f(x) = g(3x - 4) = (3x - 4)^2 - 2(3x - 4) + 1 = 9x^2 - 30x + 25$	۴
$g(x) = \frac{3}{4}f(x) - v$ $(f - g)(x) = f(x) - g(x) = f(x) - \frac{3}{4}f(x) + v = -\frac{1}{4}f(x) + v = -x + 5$ $f(x) = 4x + 4$ $g(x) = \frac{3}{4}(4x + 4) - v = 3x - 1$ $f \circ g(x) = f(g(x)) = 4(3x - 1) + 4 = 12x = 0 \rightarrow x = -\frac{1}{3} = a$	۵

$$g \circ f(x) = \log_{\frac{1}{2}} x = 2x \quad D_{g \circ f} = \{x \in D_f, f(x) \in D_g\} = \mathbb{R}$$

$$f \circ g(x) = 9^{\log_{\frac{1}{2}} x} = 2^{\log_{\frac{1}{2}} x^2} \quad D_{f \circ g} = \{x \in D_g, g(x) \in D_f\} = (0, +\infty)$$

$$f \circ g(x) \leq g \circ f(x) \rightarrow 2^{\log_{\frac{1}{2}} x^2} \leq 2x \rightarrow \log_{\frac{1}{2}} x^2 \leq \log_{\frac{1}{2}} 2x \rightarrow x^2 \geq 2x \rightarrow x(x-2) \leq 0$$

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

۳ عضو

{0, 1, 2} ✓ اعضای صحیح

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

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

۲

۲

$$f \circ g(x) = \log_{\frac{1}{2}} x - x^2$$

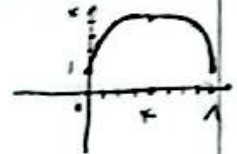
$$D_{f \circ g} = \{x \in D_g, g(x) \in D_f\} = [0, 1] = A$$

$$D_g = \mathbb{R}$$

$$R_{f \circ g} = [0, 4] = B = (-\infty, 4]$$

$$D_f = (0, +\infty)$$

$$A \cap B = [0, 4]$$



۸

۱

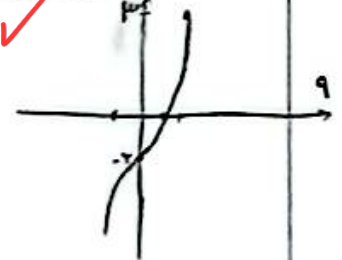
$$A \cap B = [0, 4] \rightarrow \text{اعضای صحیح}$$

$$f(f(x)) = 1 - 3f^2(x) \rightarrow f(x) = 1 - 3x^2$$

$$h(g(x)) = (x-1)^3 + 2(x-1) + 1 = x^3 - 3x^2 + 5x - 2 = 1 - 3x^2 \rightarrow x^3 + 5x - 3 = 0$$

یک ریشه دارد با معادله $x^3 + 5x - 3 = 0$ یک ریشه

$$\begin{array}{c|ccccccc} x & -2 & -1 & 0 & 1 & 2 & 3 \\ \hline y & -8 & -2 & -3 & 2 & 13 & 27 \end{array}$$



۲

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

$$g(f(x)) = ax^2 + 2x \rightarrow g(\frac{x^2 - 4}{x}) = ax^2 + 2x$$

$$g(2) = 1$$

$$\frac{x^2 - 4}{x} = 2 \rightarrow x^2 - 2x - 4 = 0 \rightarrow (x-4)(x+1) = 0 \rightarrow \begin{cases} x = -1 \rightarrow g(2) = -a - 2 = 1 \\ x = 4 \rightarrow g(2) = 4a + 2 = 1 \end{cases}$$

۲

$$\begin{aligned} a &= -1 \\ \uparrow \\ a &= 0 \end{aligned}$$