

$$Dg \circ f = \{x \in Df, Rf \in Dg\}$$

$$\rightarrow Df(x) = \log_2(x-1) \geq 0 \rightarrow x-1 \geq 1 \rightarrow x \geq 2 \quad I$$

$$\rightarrow x-1 \geq 0 \rightarrow x \geq 1 \quad II$$

$$Dg(x) = \{2\} \rightarrow f(x) = 2 \rightarrow \sqrt{\log_2(x-1)} = 2$$

$$\rightarrow \log_2(x-1) = 4 \rightarrow 16 = x-1 \rightarrow x = 17 \quad III$$

$$\rightarrow Dg \circ f(x) = \{17\}$$

$$f \circ g(x) = g \circ f(x)$$

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

$$f(x^2 - 3x + 1) = 2(x^2 - 3x + 1) - 5 = 2x^2 - 6x + 2 - 5 = 2x^2 - 6x - 3$$

$$g(2x - 5) = (2x - 5)^2 - 2(2x - 5) + 1 = 4x^2 - 20x + 25 - 4x + 10 + 1 = 4x^2 - 24x + 36$$

$$\rightarrow 2x^2 - 6x - 3 = 4x^2 - 24x + 36$$

$$\rightarrow 2x^2 - 20x + 39 = 0 \rightarrow (x + B)^2 = S^2 - 2P = 100 - 2 \cdot 39 = 22 \rightarrow x = \frac{10 \pm \sqrt{22}}{2}$$

$$f(x) = 2x$$

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

$$\rightarrow g(2x) = 5x^2 - 11$$

$$2x = t \rightarrow g(t) = t^2 + \frac{t^2}{5} - 11 = \frac{6}{5}t^2 - 11$$

$$\rightarrow g(x) = \frac{6}{5}x^2 - 11$$

$$\rightarrow g(x-7) = \frac{6}{5}(x-7)^2 - 11$$

نقطه اوج: $x = 7$

$$f \circ g(x) = 3x^2 - 6x - 1$$

$$\rightarrow g(x) = t$$

$$g \circ f(x) = g(3x - 4)$$

$$\rightarrow f(t) = 3t^2 - 6t - 1$$

$$f(t) = 3t^2 - 6t - 1$$

$$\rightarrow g(3x - 4) = (3x - 4)^2 - 2(3x - 4) + 1 = 9x^2 - 24x + 16 - 6x + 8 + 1 = 9x^2 - 30x + 25$$

$$2g(x) = 3f(x) - 1f$$

$$f(n) - g(n) = -n + 1$$

$$\xrightarrow{\text{استدلال}} f(n) = 2n + 2$$

- 1

$$2g(n) - 3f(n) = 1f$$

$$g(n) = 2n - 1$$

1/10

$$\rightarrow g(x) = \frac{3}{2}f(x) - \frac{1f}{2}$$

$$f(x) = -x + 1$$

$$\rightarrow -x + 1 = f(x) - \frac{3}{2}f(x) + \frac{1f}{2}$$

$$f - g(x)$$

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

$$-\frac{1}{2}x + 1 = 4n + 2$$

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

$$a = -\frac{1}{2}$$

$$f(g(x)) = 0$$

$$x = a$$

$$g(x) = \frac{1}{2}$$

$$\frac{3}{2}(-2x + \frac{2}{2}) - \frac{1f}{2} = \frac{1}{2}$$

$$\rightarrow -3x + 1 = 1 \rightarrow x = -\frac{2}{3}$$

$$a = -\frac{2}{3}$$

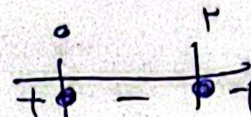
$$f(g(x)) \leq g(f(x))$$

$$f(g(x)) = \log_9^x \log_9^x \rightarrow f(g(x)) = x^2$$

2

$$g(f(x)) = \log_9^x = 2x$$

$$\rightarrow x^2 \leq 2x \rightarrow x^2 - 2x \leq 0$$



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

یا جواب شامل 3 جواب صحیح است

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

$$\frac{x^2-2}{x} = x - \frac{2}{x} \quad I$$

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

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

$$\rightarrow f(x) = x^2 + x$$

2

با سبب دوار هم بر

$$Df(g(x)) = \{x \in Dg \mid x \in \{g(x) \in Df(x)\}\}$$

1, 20

$$Df(g(x)) =$$

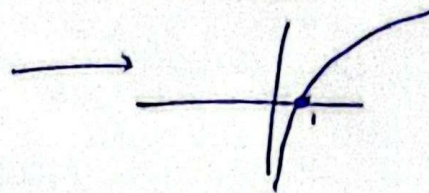
$$Dg(x), \mathbb{R} \rightarrow \boxed{Df(x) \times \mathbb{R}} \rightarrow g(x) > 0$$

$$\rightarrow -x^2 \wedge x > 0 \quad \wedge \quad \rightarrow x \in (0, \infty)$$

$$\rightarrow \frac{1}{x} + \frac{1}{x} =$$

$$\rightarrow \boxed{Df(x) = (0, \infty)} = A$$

$$Rf(g(x)) = Rf(x) \rightarrow f(x) = \log x$$



$$\rightarrow \boxed{Rf(g(x)) = Rf(x) = \mathbb{R} = \mathbb{B}}$$

$$\rightarrow \boxed{A \cap B = \mathbb{R} \cap (0, \infty) = (0, \infty)}$$

$$\rightarrow \boxed{A \cap B \text{ شامل } \mathbb{R} \text{ است}}$$

$$Rg = (-\infty, 1] \xrightarrow{\log x} (-\infty, 1] \rightarrow Rf \circ g = (-\infty, 1]$$

$$Df \circ g = (0, \infty) \rightarrow A \cap B = (0, 1] \text{ صحیح است}$$

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

$$\rightarrow \boxed{f(x) = t}$$

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

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

9

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

2

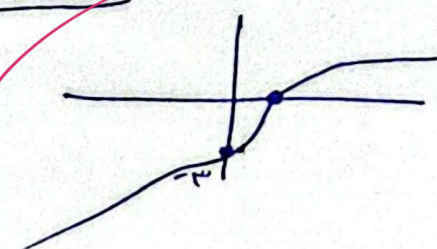
$$\rightarrow h(x-1) = (x-1)^3 + 2(x-1) + 1 = x^3 - 3x^2 + 3x - 1 + 2x - 2 + 1$$

$$= x^3 - 3x^2 + 5x - 2 = 1 - 3x^2$$

$$\rightarrow \boxed{x^3 + 5x - 3 = 0}$$

شتاب همواره مثبت
تابع چون شتاب همواره مثبت دارد
پس تنها در یک نقطه محور x را قطع می کند

فشار یک جواب دارد



$$g(f(x)) = ax^2 + rx$$

$$g(r) = 1$$

-1

$$f(x) = x - \frac{r}{x}$$

$$g(r) = 1$$

$$\rightarrow \boxed{f(x) = r} \rightarrow x - \frac{r}{x} = r \rightarrow \boxed{x = r, -1}$$

(1)

$$g(r) = 1$$

$$\rightarrow g(r) = -a - r \rightarrow -a - r = 1 \rightarrow \boxed{a = -1}$$

$$\rightarrow g(r) = 4ra + 1 \rightarrow 4ra + 1 = 1 \rightarrow \boxed{a = 0}$$