

$$Df: \log_r^{(n-1)} > 0 \Rightarrow (n-1) > \frac{1}{r} \Rightarrow n > \frac{1}{r} + 1, n-1 > 0 \Rightarrow n > 1$$

$$Dg: -x^r + rx - r > 0 \xrightarrow{x-1} x^r - rx + r < 0 \Rightarrow (n-r)^r < 0 \Rightarrow n=r$$

$$D_{f \circ g}: \{k \in D_f \mid f(n) \in D_g\} \Rightarrow f(n) = r \Rightarrow \log_r^{(n-1)} = r \Rightarrow n=11 \quad D_{f \circ g}: \{11\}$$

$$f \circ g: f(g(n)) = rx^r - 4x + 11, \quad g \circ f: g(f(n)) = rx^r - 24x + 41$$

$$f \circ g: g \circ f \Rightarrow rx^r - 4x + 11 = rx^r - 24x + 41 \Rightarrow rx^r - 20x + 30 = 0$$

$$\alpha^r + \beta^r: S^r - 2P = 100 - 2V: 43 \quad x^r - 10x + 11, \Delta$$

$$S: +10 \quad P: 11, \Delta$$

$$f(n): rx \rightarrow f^{-1}: \frac{rx}{r} \quad g \circ f: \Delta x^r + 11 \Rightarrow \Delta \left(\frac{rx}{r} \right) + 11 = \frac{\Delta}{r} x^r + 11$$

$$\frac{\Delta}{r} (n-r)^r + 11 \Rightarrow \frac{\Delta}{r} (x^r - 14x + 49) + 11$$

$$\frac{\Delta}{r} x^r - \frac{14}{r} x + \frac{49}{r} \xrightarrow{\text{min}(S)} x_0 = \frac{b}{r_0} = \frac{\frac{14}{r}}{\frac{1}{r}} = 14$$

$$g(r-r): \frac{\Delta}{r} 1 + 11 \quad g(0): 11$$

$$f(n): 3n - 4$$

$$f(g(n)): 3x^r - 4x - 1$$

$$\Rightarrow 3g(n) - 4: 3x^r - 4x - 1 \Rightarrow g(n): x^r - 4x + 1$$

$$g(f(n)): (3n-4)^r - 4(3n-4) + 1 = 9x^r - 20x + 15$$

$$43$$

$$f-g \in \mathbb{Z} \Rightarrow a=-1: y: ax+b: y=-x+d: f(n)-g(n): -x+d$$

$$3x+4-g(n): -x+d \Rightarrow g(n): 3x-1$$

$$f \circ g: f(g(n)): 3(3x-1) + 4 = 9x+1$$

$$3f(n) - 1g(n): 14$$

$$\hookrightarrow 1, \Delta f(n) - g(n) = 14$$

$$9x+1=0 \Rightarrow 9x=-1$$

$$x: -\frac{1}{9} = -\frac{1}{r} = 9$$

$$f(n): 3x+4 \leftarrow 0, \Delta f(n): x+1$$

$$1, \Delta f(n) - f(n) - x + d = 14$$

$$-f(n) - x + d$$

$$g(u): \log_u^2, f(u): u^2 \Rightarrow f \circ g: u^{\log_u^2} = u^{\log_u^1} = \underline{u^2}$$

$$g \circ f: \log_u^{u^2} = u \log_u^1: 2u$$

$$\xrightarrow{\text{بازرسی معادله}} u^2 \leq 2u \Rightarrow u^2 - 2u \leq 0 \rightarrow u(u-2) \leq 0$$

$$\boxed{2, 1} \quad \text{تعداد اعضاء برابر با ۲: ۱ و ۲} \quad \begin{matrix} 0 < u \leq 2 \\ \uparrow \quad \uparrow \end{matrix} \quad \begin{matrix} u > 0 \\ \text{احتمال شرط لازم} \end{matrix} \quad \begin{matrix} + & - & + \\ 0 & 2 & 0 \end{matrix}$$

$$\xrightarrow{\text{مدرج کردن}} f(u - \frac{1}{u}) = (u^2 + \frac{4}{u^2}) + (u - \frac{1}{u}) - 4$$

$$\xrightarrow{t: u - \frac{1}{u}} t^2 + \frac{4}{t^2} = u^2 - 4 + \frac{4}{u^2} \Rightarrow t^2 + \frac{4}{t^2} = (u^2 + \frac{4}{u^2})$$

$$\rightarrow f(t): (t^2 + \frac{4}{t^2}) + t - 4: t^2 + t \Rightarrow \boxed{f(u): u^2 + u}$$

$$f(u): \log_u^2, g(u): 1u - u^2 \Rightarrow f \circ g: \log_u^{1u - u^2}$$

$$\Rightarrow A: D_f: 1u - u^2 > 0 \Rightarrow u(1-u) > 0 \Rightarrow \frac{0}{-1} \wedge \frac{1}{-} \Rightarrow (0, 1)$$

$$\Rightarrow B: R_f \xrightarrow[\text{از } y \text{ استفاده می کنیم}]{y \text{ در } x} u^2: -\frac{b}{2a}: \frac{-1}{-2}: \frac{1}{2} \Rightarrow a > 0 \xrightarrow{\max} 1 - \frac{1}{4}: \frac{1}{4} \Rightarrow \log_u^{\frac{1}{4}}: \frac{1}{4}$$

$$\hookrightarrow R_f: (-\infty, \frac{1}{4}] \quad (0, 1) \cap (-\infty, \frac{1}{4}] = (0, \frac{1}{4}] \quad \boxed{\text{عضو دارد}}$$

$$g(u): u-1, h(u): u^3 + 2u + 1 \Rightarrow h(g(u)): (u-1)^3 + 2(u-1) + 1$$

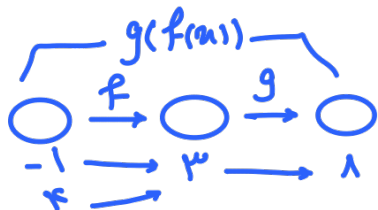
$$f \circ f: 1 - 3f^2(u): f(f(u)): 1 - 3(f(u))^2 \Rightarrow h(g(u)): u^3 - 3u^2 + 5u - 2$$

$$\hookrightarrow f(u): \underline{1 - 3u^2} \quad u^3 - 3u^2 + 5u - 2 = 1 - 3u^2$$

$$u^3 + 5u - 3 = 0$$

$\boxed{\text{ریشه دارد}}$

تعریف ریاضی:
تابع مرکب:



$$u - \frac{4}{u} = 3 \Rightarrow u^2 - 3u - 4 = 0 \rightarrow -1 \quad \checkmark$$

$$-a - 2 = 1 \rightarrow a = -1$$

$$4a + 1 = 1 \rightarrow a = 0$$

$$-1 \Rightarrow g(f(-1)): -a - 2: 3$$

$$4 \Rightarrow g(f(4)): 4a + 1: 3$$

$$-a = 5 \rightarrow \boxed{a: -5}$$

$$4a = -5$$

$$\boxed{a: \frac{-5}{4}}$$

امیرعلی جهانیشاه و تشدر از لطف شما