

$$D_{g \circ f} = \{x \in D_f \mid f(x) \in D_g\} \rightarrow D_f = \left\{ \begin{array}{l} x-1 > 0 \rightarrow x > 1 \\ \log_{\frac{1}{r}} x > 0 \rightarrow x-1 > r-1 \rightarrow x > r \end{array} \right\} \xrightarrow{\Delta} D_f = [r, +\infty) \quad (1)$$

$$D_g \Rightarrow -x^r + (x-1) > 0 \rightarrow \frac{r}{-r} \rightarrow D_g = \{ \cdot \} \rightarrow f(x) \in D_g \rightarrow \sqrt[r]{\log_{\frac{1}{r}} x} = \cdot \rightarrow x = r \quad (2)$$

$$D_{g \circ f} = (1) \cap (2) = \{r\}$$

$$f \circ g = r(x^r - (x+1) - 1) = r x^r - r x - 1 \quad \left\{ \begin{array}{l} \rightarrow g \circ f = f \circ g \Rightarrow r x^r - r x + r = r x^r - r x - 1 \end{array} \right. \quad (3)$$

$$g \circ f = (r x - 1)^r - r(r x - 1) + 1 = r x^r - r x + 1$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{r \pm \sqrt{r^2 - 4(r)(r)}}{2} \rightarrow \begin{array}{l} x_1 = \frac{1 + \sqrt{r^2}}{r} \rightarrow x_1 + x_2 = \frac{r + 0}{r} = 1 \\ x_2 = \frac{1 - \sqrt{r^2}}{r} \end{array}$$

$$g \circ f = g(r x) = 2 x^r + 1 \rightarrow r x = t \rightarrow x = \frac{t}{r} \rightarrow g(t) = 2 \left(\frac{t}{r}\right)^r + 1 = \frac{2 t^r}{r^r} + 1 \quad (4)$$

$$\rightarrow g(x) = \frac{2 x^r}{r^r} + 1 \rightarrow g(u-v) = \frac{2(u-v)^r}{r^r} + 1 = \frac{2}{r^r} x^r - \frac{2v}{r^r} x + \frac{r^r + 1}{r^r} \rightarrow \min \left| \frac{b}{r^r} \right| = \frac{2v}{r^r}$$

$$f \circ g = r g - 1 = r x^r - r x - 1 \rightarrow r g = r x^r - r x + r \rightarrow g = x^r - r x + 1 \quad (5)$$

$$g \circ f = (r x - 1)^r - r(r x - 1) + 1 = r x^r - r x + 1$$

$$g(x) = ax + b \rightarrow r g = r f - 1 \rightarrow r a x + r b = r c x + r d - 1 \rightarrow \begin{cases} r a = r c \rightarrow a = \frac{r}{r} c = c \\ r b = r d - 1 \rightarrow b = \frac{r d - 1}{r} \end{cases} \quad (6)$$

$$\rightarrow f - g = (x + d) - (ax + b) = (c-a)x + d - b \xrightarrow{1^\circ} d - b = 0 \rightarrow d - \frac{r d - 1}{r} = 0 \rightarrow d = 1$$

$$b = -1$$

$$\xrightarrow{2^\circ} a(c-a) + 1 + 1 = 0 \rightarrow c-a = -1 \rightarrow c - \frac{r}{r} c = -1 \rightarrow c = r \rightarrow a = r$$

$$g(x) = r x - 1 \quad \left\{ \begin{array}{l} f \circ g = r(r x - 1) + 1 = r x + r \\ f(x) = r x + 1 \end{array} \right. \xrightarrow{1^\circ} r a + r = 0 \rightarrow r a = -r \rightarrow a = -1$$

$$f \circ g \leq g \circ f \rightarrow a \log_{\frac{1}{r}} r \leq \log_{\frac{1}{r}} a \rightarrow n \log_{\frac{1}{r}} r \leq n \log_{\frac{1}{r}} a \rightarrow x^r \leq r x \rightarrow x^r - r x \leq 0 \rightarrow \frac{x^r}{r} - x \leq 0 \quad (7)$$

$$D_g = (0, +\infty) \rightarrow x \in (0, r] \rightarrow \text{مجموعة } x$$

$$f\left(n - \frac{r}{n}\right) = x^r - r + \frac{r}{n} + x - \frac{r}{n} \rightarrow f(t) = t^r + t \rightarrow f(x) = x^r + x \quad (8)$$

$$D_{f \circ g} = \{ x \in D_g, g(x) \in D_f \} \rightarrow D_g = \mathbb{R} \text{ ①}, D_f \Rightarrow n > 0 \rightarrow \wedge n - n^c > 0 \rightarrow \frac{0 \wedge}{-4+1} \text{ ②}$$

$$x \in (0, \wedge) \xrightarrow{\text{①}} D \cap D = D_{f \circ g} = (0, \wedge) = A$$

$$f \circ g = \log_r \wedge n - n^c \xrightarrow{R_{f \circ g}} \max \log_r \wedge n - n^c \rightarrow \max \left| \frac{-6}{14} \right| 2^c \rightarrow \log_r 14 \cdot 2^c \rightarrow R_{f \circ g} (0, \epsilon] = \beta$$

$$B \wedge A \in (0, \epsilon] \rightarrow \left[\frac{-6}{14} \right] \xrightarrow{D_{f \circ g}} \min = 0 \rightarrow \text{چون در این بازه در تمام نقاط بازه باز (0, \epsilon] داریم.}$$

$$f(f(n)) \in 1 - r f(n) = 1 - r t^c \rightarrow f(n) \in 1 - r n^c \quad \left\{ \begin{array}{l} \rightarrow f(n) \in \log(x) \rightarrow x^r + 0x - r_2. \end{array} \right. \text{ ③}$$

$$\log_2 (x-1)^c + r(n-1) + 1$$

$$g(r) \in \wedge \rightarrow f(n) \in r - n - \frac{\epsilon}{n} \in r - n^c - r n - \epsilon \in \begin{cases} x \in -1 \\ n \in \epsilon \end{cases} \text{ ④}$$

$$g \circ f \in \begin{cases} x \rightarrow -a = 1. \rightarrow a = -1. \\ n \in 4 \leq a + \wedge \in \wedge \rightarrow a = 0 \end{cases}$$