

Subject: _____

Date: _____

$$f(n+2) = \begin{cases} 3n+5 & n \geq 1 \\ 2n-1 & n < 1 \end{cases} \Rightarrow \begin{cases} 3(n+2)-1 & n \geq 1 \\ 2(n+2)-9 & n < 1 \end{cases} \rightarrow f(n) = \begin{cases} 3n-1 & n \geq 1 \\ 2n-9 & n < 1 \end{cases} \quad (1)$$

$$f(3-n) \geq f(n+1) \xrightarrow{\text{تابع صعودی}} 3-n \geq n+1 \Rightarrow \boxed{n \leq 1}$$

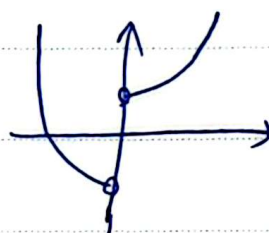
$$f \circ f(n) \leq f(n^3) \xrightarrow{\text{تابع اکید صعودی}} f(n) \leq n^3 \rightarrow (n^3+n)^3 \leq n^{\frac{3}{2}} \rightarrow n^3+n \leq n^{\frac{3}{2}} \quad (2)$$

$$\boxed{n \leq 0} \leftarrow n^3 \leq 0$$

$$y = |n| \left(n^2 + \frac{1}{n} \right) \rightarrow n \neq 0$$

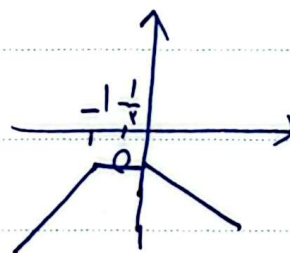
$$n > 0 \rightarrow n \left(n^2 + \frac{1}{n} \right) = n^3 + 1$$

$$n < 0 \rightarrow -n \left(n^2 + \frac{1}{n} \right) = -n^3 - 1$$



تابع غیر یکنوا

$$\begin{cases} n > 0 \rightarrow \frac{2n+1}{-1} = -2n-1 \text{ نزولی} \\ 0 > n > -1 \rightarrow \frac{2n+1}{-2n-1} = -1 \text{ ثابت} \\ n < -1 \rightarrow \frac{2n+1}{-n+n+1} = 2n+1 \text{ صعودی} \end{cases}$$



$$\boxed{a_{n+1} = 0}$$

$$2n^2 - 2n - 1 > 0 \Rightarrow (n-1)(n+2) > 0 \xrightarrow{+1-1+} \Rightarrow (-\infty, -2) \cup (1, +\infty) \quad (3)$$

$$n_1 = \frac{1}{2} \rightarrow \text{بین صفر و 1} \Rightarrow \text{و اما کافی} \xrightarrow{*} \boxed{(-\infty, -2)} \Rightarrow \text{اکید صعودی}$$

$$y = a^n \rightarrow a > 0 \rightarrow f(n) = (a^2-3)^n \rightarrow a^2-3 > 0 \rightarrow \begin{cases} a > \sqrt{3} \\ a < -\sqrt{3} \end{cases} \quad (4)$$

$$t^n = (a^2-3)^n \xrightarrow{\text{تبدیل}} t > 1 \rightarrow a^2-3 > 1 \Rightarrow \begin{cases} a > 2 \\ a < -2 \end{cases}$$

$$\text{الف) } a \in (-\infty, -2) \cup (2, +\infty) \xleftarrow{\text{اکید صعودی}} : n_1 < n_2 \Rightarrow f(n_1) < f(n_2)$$

$$\text{ب) } a \in (-\infty, -2] \cup [2, +\infty) \xleftarrow{\text{صعودی}} : n_1 < n_2 \Rightarrow f(n_1) \leq f(n_2)$$



$$\text{الف) } \Rightarrow \boxed{a > 2 \vee a < -2}$$

$$\text{ب) } \Rightarrow \boxed{a \in (-\infty, -2] \cup [2, +\infty) \cup [-\sqrt{3}, \sqrt{3}]}$$

$$f(m) = m^3 + am^2 + bm + c \xrightarrow{\text{مشتق}} f'(m) = 3m^2 + 2am + b \quad (1)$$

$$f(-3) = -27 + 9a - 3b + c = -1 \rightarrow 9a - 3b + c = 26$$

$$f'(-3) = 9 \times 9 + 2a(-3) + b \rightarrow 27 - 6a + b = 0 \rightarrow \underline{b = 6a - 27}$$

$$\rightarrow 9a - 3(6a - 27) + c = 26 \rightarrow \underline{c = 9a - 50}$$

$$f(m) = m^3 + am^2 \rightarrow (9a - 27)m + 9a - 50 \rightarrow f'(m) = 3m^2 + 9(m - \frac{9a}{3})$$

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$$\underbrace{f \circ f(m)}_{f(f(m))} \text{ و } f(\sqrt{m}) \Rightarrow m + \sqrt{m} - 2 + \sqrt{m + \sqrt{m} - 2} \rightarrow \sqrt{m} + \sqrt{m} \quad (1)$$

$$\cos^2 \theta \rightarrow 1 \rightarrow \sqrt[3]{9-1} - \sqrt[3]{1-9} = \sqrt[3]{8} - \sqrt[3]{-8} = 2 - (-2) = 4 = \frac{10}{2} = b \quad (2)$$

$$\cos^2 \theta \rightarrow 0 \rightarrow \sqrt[3]{1-1} - \sqrt[3]{1-1} = \frac{1}{2} - 2 = -\frac{3}{2} = a \rightarrow b - a = \frac{10}{2} - (-\frac{3}{2}) = \frac{13}{2} \quad (3)$$

$$f(m) = m - [m+2] \quad g(m) = \frac{2^m - 2^{-m}}{2} \quad g(f(m)) = \frac{2^{m-[m+2]} - 2^{-m+[m+2]}}{2} \quad (4)$$

$$R_f = [-2, 9-1] \Rightarrow g(2) = \frac{2^2 - 2^{-2}}{2} = \frac{15}{4}$$

$$g(-1) = \frac{2^{-1} - 2^1}{2} = \frac{1}{2} - 2 = -\frac{3}{2}$$

$$R_{g \circ f} = \left[-\frac{3}{2}, \frac{15}{4} \right]$$