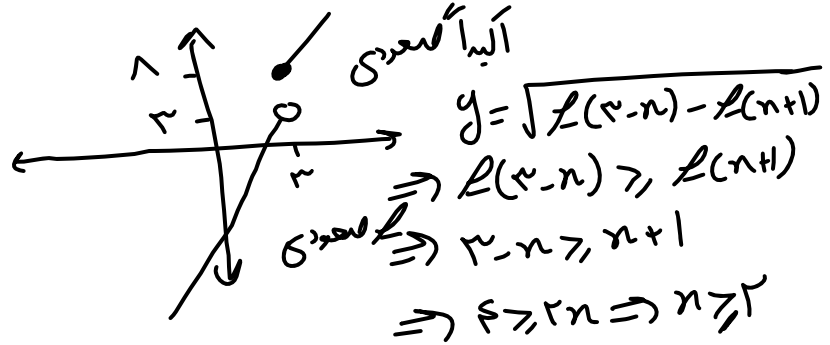


$$f(n+r) = \begin{cases} 3n+2 & ; n \geq 1 \\ 5n-1 & ; n < 1 \end{cases}$$

$$n+r=t \Rightarrow n=t-r$$

$$f(t) = \begin{cases} 3t-1 & ; t \geq 3 \\ 5t-9 & ; t < 3 \end{cases}$$



۱

تابع معدی
آبیا است

$$\Rightarrow n^3 + n < n$$

$$\Rightarrow n^3 < 0$$

$$\Rightarrow \underline{n < 0}$$

$$f \circ f(n) < f(n^3)$$

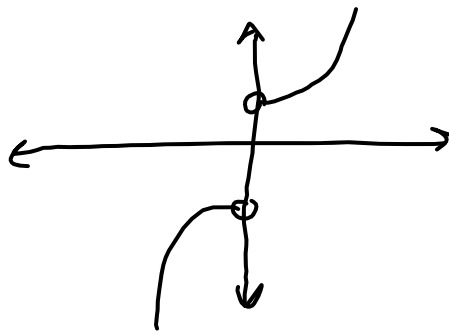
$$\Rightarrow f(n) < n^3$$

$$\Rightarrow (n^3 + n)^3 < n^3$$

۲

$$x > 0 \Rightarrow y = x^3 + 1$$

$$x < 0 \Rightarrow y = x^3 - 1$$



آبیا آبیا

۳

$$y = |x| - |x+1|$$

$$x > 0 \Rightarrow y = -1 \Rightarrow f(x) = -2x - 1$$

$$-1 < x \leq 0 \Rightarrow y = -2x - 1 \Rightarrow f(x) = -1 \rightarrow \text{ثابت}$$

$$-1 \geq x \Rightarrow y = 1 \Rightarrow f(x) = 2x + 1 \rightarrow \text{آبیا معدی}$$

$\Rightarrow$ تابع f در بازه $[-\infty, 0]$ و $(0, \infty)$ معدی است

۴

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

دائری g (۷)

$$g(x) = -\log_r x \quad \text{نزولی}$$

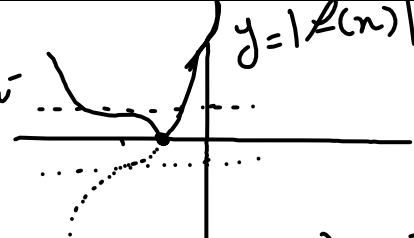
$$x^2 - 2x - 1 > 0 \Rightarrow x \in (-\infty, -2) \cup (4, +\infty)$$

$$g \circ f(x) \text{؟ در دامنه معدی} \Rightarrow f(x) \text{ در دامنه معدی نزولی}$$

$$\textcircled{1} \textcircled{7} \Rightarrow x \in (-\infty, -2)$$

۵

$$\textcircled{1} f(x) \text{ سری رو به بالا} \Rightarrow x \in (-\infty, -\frac{b}{2a}] \Rightarrow x \in (-\infty, 1]$$

$a^2 - 3 \geq 1 \cup a^2 - 3 = 0 \quad \Leftrightarrow \quad a^2 - 3 > 1 \quad \text{النسبة}$ $\downarrow \quad \downarrow$ $a \in \mathbb{R} - (-2, 2) \cup a = \pm\sqrt{3}$ $\Rightarrow a \in \mathbb{R} - (-2, 2) \cup \{-\sqrt{3}, \sqrt{3}\}$	6
$L(n) = n^3 + an^2 + bn + c$ $L'(n) = 3n^2 + 2an + b \quad -3 \text{ مقلوب}$ $\Rightarrow a = 9, b = 27$ $\Rightarrow L(n) = n^3 + 9n^2 + 27n + c$ $L(-3) = -27 + 81 - 81 + c = -1 \Rightarrow c = 26$ $L(n) = n^3 + 9n^2 + 27n + 26 = (n+3)^3 - 1 \Rightarrow [-2, +\infty) \quad \text{نقطة ل}$ 	7
$L \text{ كائنا ما كان له معنى}$ $D_L = [0, +\infty) \quad (2)$ $L_0 L(n) \leq L(\sqrt{n}) \quad (1) \text{ و } (2) \Rightarrow n \in [0, 2]$ $\Rightarrow L(n) \leq \sqrt{n}$ $\Rightarrow n + \sqrt{n} - 2 \leq \sqrt{n}$ $\Rightarrow n - 2 \leq 0 \Rightarrow n \leq 2 \quad (1)$	8
$t = \sqrt[3]{\sqrt{9\cos^2 n - 1}} \quad \sqrt[3]{1 - 9\cos^2 n} = \frac{1}{t}$ $\cos^2 n = 1 : \max(t) = 3$ $\cos^2 n = 0 : \min(t) = \frac{1}{3}$ $L(n) = t - \frac{1}{t} \Rightarrow R_L = \left[\frac{1}{3} - \frac{1}{\frac{1}{3}}, 3 - \frac{1}{3} \right] = \left[-1, 2 \right]$ $\downarrow \quad \downarrow$ $a \quad b$	9
$D_L = [2, 3)$ $t = r^n \Rightarrow t < 1$ $g(n) = \frac{t - \frac{1}{t}}{r}$ $\Rightarrow R_{g \circ L} = \left[\frac{3 - \frac{1}{3}}{r}, \frac{1 - \frac{1}{1}}{r} \right] = \left[\frac{1}{1}, \frac{9}{19} \right]$	10