

$$\Rightarrow f(x) = \begin{cases} 2x-1 & x \geq 2 \\ \varepsilon x - 9 & x < 2 \end{cases}$$

$$\Rightarrow f(x+1) = \begin{cases} 2x-1 & x \geq 1 \\ \varepsilon x - 12 & x < 1 \end{cases}$$

$$\Rightarrow f(2-x) = \begin{cases} 1-2x & x \leq 0 \\ 2-x & x > 0 \end{cases}$$

$$\Rightarrow f(x) > f(x+1)$$

$$\begin{array}{c|c|c} 0 & 2 & \\ \hline 1-2x & 2-x & 2-x \\ \hline x \leq 2 & x \leq 2 & x \leq \frac{2}{\varepsilon} \end{array}$$

$$\Rightarrow D_f = (-\infty, 2/2] \cup (2, \frac{2}{\varepsilon}]$$

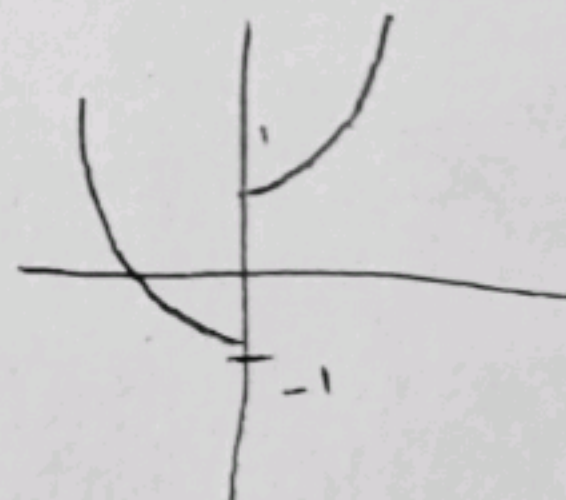
$$f(x) = (x^2+x)^2, f(x) > f(f(x)) \xrightarrow{\text{در صورتی که}} f^{-1}(f \circ f(x)) < f^{-1}(f(x)) \quad (2)$$

$$\rightarrow f(x) < x^2 \rightarrow (x^2+x)^2 < x^2 \rightarrow x^2+x < x \rightarrow x^2 < 0$$

$$\Rightarrow \boxed{x < 0}$$

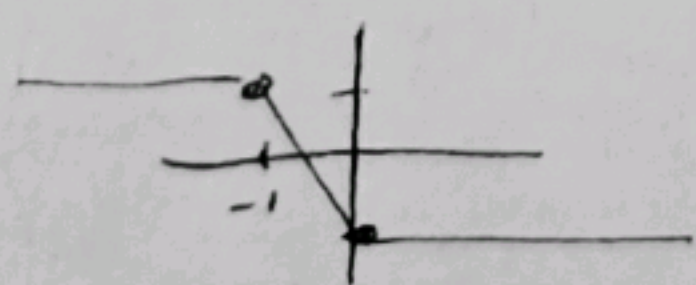
$$x > 0 \rightarrow f(x) = x^2 + 1$$

$$x < 0 \rightarrow f(x) = -x^2 - 1$$



مربوط است.

$$f(x) = \frac{2x+1}{|x|-|x+1|} \rightarrow \text{در صورتی که } x < -1 \Rightarrow f(x) = \frac{2x+1}{1} = 2x+1$$

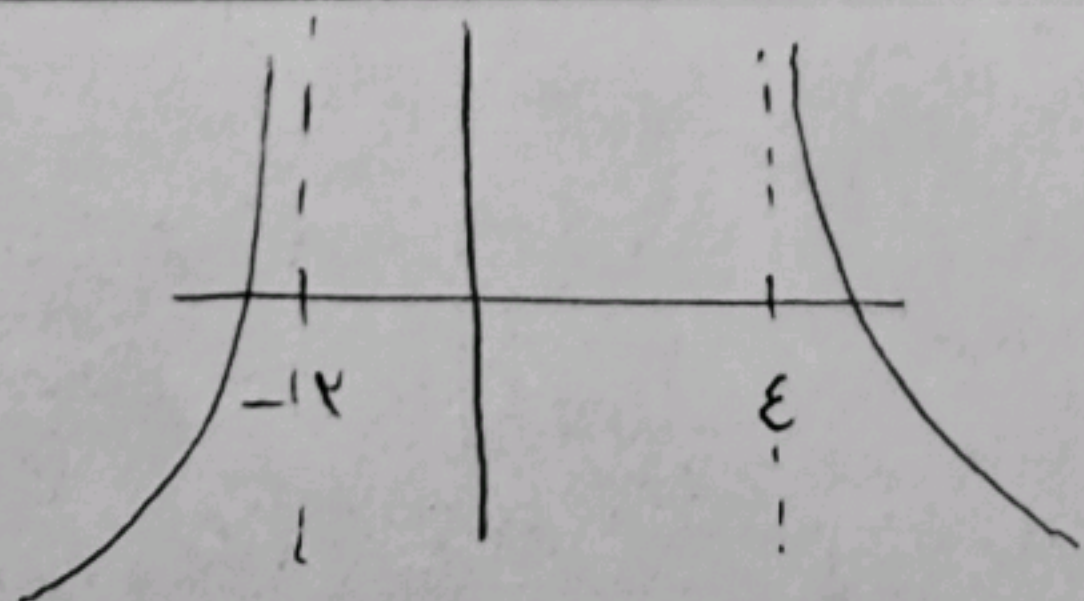


$$\Rightarrow (-\infty, a] = (-\infty, -1] \Rightarrow \boxed{a = -1}$$

(بسته به مقادیر)

(2)

در صورتی که



$$\Rightarrow (-\infty, -1) \Rightarrow$$

در صورتی که

$$x^2 - 2x - 1 > 0 \rightarrow (x-1)^2 > 2 \rightarrow x < -1$$

$$x^2 - 2x - 1 > 0 \rightarrow (x-1)^2 > 2 \rightarrow x < -1$$

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

(4)

$$\text{عند } x \rightarrow 0 \text{ } f \rightarrow a^x - 1 > 1 \Rightarrow a^x > 2 \Rightarrow \boxed{a > 2 \vee a < -2} \quad (\text{الف})$$

$$\text{عند } x \rightarrow \infty \text{ } f \rightarrow a^x - 1 \gg 1, a^x - 1 = 0 \Rightarrow \boxed{a = \pm \sqrt{x}} \Rightarrow (-\infty, -1] \cup [1, +\infty)$$

$$f(x) = x^x + ax^x + bx + c = (x+1)^x - 1 \quad \begin{cases} a=1 \\ b=1 \\ c=1 \end{cases}$$

$$|f(x)| \rightarrow \begin{array}{c} \text{Graph of } y = x^x \\ \text{Minimum at } (1, 1) \end{array} \xrightarrow{c=k} (1, +\infty) \Rightarrow \boxed{k_{\min} = 1}$$

$$f(f(x)) \leq f(\sqrt{x}) \xrightarrow{f^{-1}} f(x) \leq \sqrt{x} \xrightarrow{f(x) = x + \sqrt{x} - 1} x + \sqrt{x} - 1 \leq \sqrt{x}$$

$$x + \sqrt{x} - 1 \leq \sqrt{x} \rightarrow x \leq 1 \quad D_f = [0, +\infty) \Rightarrow \boxed{0 \leq x \leq 1}$$

$$f(x) = \sqrt[x]{9 \cos^2 x} - \sqrt[x]{1 - 9 \cos^2 x}, \quad R_f = [a, b]$$

$$\text{عند } x=0 \rightarrow f = \frac{1}{1} - 1 = 0, \quad \text{عند } x=\frac{\pi}{2} \rightarrow f = \frac{1}{0} - 0 = \infty \Rightarrow R_f = \left[\frac{1}{\pi}, \frac{1}{\varepsilon} \right] \Rightarrow b-a = \frac{1}{\varepsilon} + \frac{1}{\pi} = \frac{1}{\varepsilon}$$

$$f(x) = x - \lfloor x \rfloor - 1$$

$$g(x) = \frac{x^n - 1}{x} \Rightarrow g \circ f(x) = \frac{(x - \lfloor x \rfloor - 1)^n - 1}{x - \lfloor x \rfloor - 1} \Rightarrow R = \left(-\frac{1}{\varepsilon}, -\frac{1}{\lambda} \right)$$