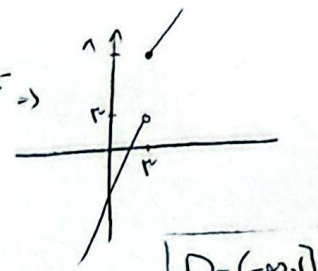


$$f(x+2) = \begin{cases} 2x+4 & x \geq 1 \\ 4x-1 & x < 1 \end{cases} \Rightarrow f(x) = \begin{cases} 2x-1 & x \geq 3 \\ 4x-9 & x < 3 \end{cases} \rightarrow \text{تابع صعودی}$$


$D = (-\infty, 3]$

$x+2=t \Rightarrow x=t-2 \Rightarrow 2x+4=2(t-2)+4=2t-1 \quad x \geq 1 \Rightarrow t-2 \geq 1 \Rightarrow t \geq 3$
 $4x-1=4(t-2)-1=4t-9 \quad x < 1 \Rightarrow t-2 < 1 \Rightarrow t < 3$

$y = \sqrt{f(3-x) - f(x+1)} \xrightarrow{\text{در دامنه تعریف}} f(3-x) - f(x+1) \geq 0 \Rightarrow f(3-x) \geq f(x+1) \xrightarrow{\text{تابع صعودی}} 3-x \geq x+1 \Rightarrow x \leq 1$

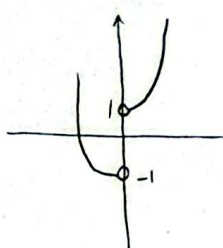
$f(x) = (x^2+x)^2 \rightarrow \text{تابع صعودی} \rightarrow \text{برابر شدن در } x=0$

$f(x) < f(x^2) \xrightarrow{\text{تابع صعودی}} f(x) < x^2 \rightarrow (x^2+x)^2 < x^2 \rightarrow x^2+x < x \rightarrow x^2 < 0 \rightarrow x < 0$

$x \in (-\infty, 0)$

$y = |x| \left(x^2 + \frac{1}{x} \right)$

$x > 0 \rightarrow x(x^2 + \frac{1}{x}) = x^3 + 1$
 $x < 0 \rightarrow -x(x^2 + \frac{1}{x}) = -(x^3 + 1)$

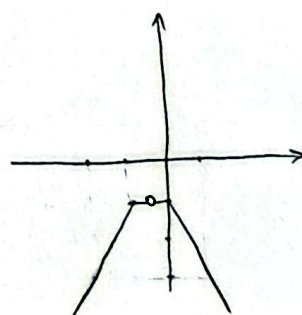


دامنه تعریف

$f(x) = \frac{x^2+1}{|x|-|x+1|} \Rightarrow$

x	-1	0
$\frac{x^2+1}{-x-x+1}$	$\frac{x^2+1}{-x-x-1}$	$\frac{x^2+1}{x-x-1}$
$= \frac{x^2+1}{-2x+1}$	$= \frac{x^2+1}{-2x-1} = -1$	$= \frac{x^2+1}{-2x-1} = -(x+1)$
	$-(x^2+1)x \neq -\frac{1}{x}$	

$\Rightarrow x \in (-\infty, 0] \rightarrow a = 0$
 $-\left\{-\frac{1}{x}\right\} \quad (\text{max})$



$y = \log(x^2-2x-1)$

$\frac{1}{x} \rightarrow \log \frac{1}{x} \Rightarrow \text{الگوریتمی}$

$x^2-2x-1 = y \rightarrow (-\infty, x_{\min}) \Rightarrow x_{\min} = \frac{-b}{2a} = \frac{-(-2)}{2} = 1 \Rightarrow (-\infty, 1]$

$a^n \rightarrow a^n \quad a > 1 \rightarrow \text{تزايدی}$
 $a^n \quad a = 1 \rightarrow \text{ثابت}$
 $a^n \quad 0 < a < 1 \rightarrow \text{تناقصی}$

$f(x) = (a^x - 2)^x$
 $a^x > 2 \Rightarrow |a| > 2 \Rightarrow a > 2, a < -2$
 $a^x < 2 \Rightarrow |a| < 2 \Rightarrow -2 < a < 2$

$f(x) = x^x + ax^x + bx + c \rightarrow f(x) = (x+m)^x + x \rightarrow (-2, -1)$
 $g(x) = x^x \rightarrow (0, 0)$

$\Rightarrow f(x) = (x+2)^x - 1 \Rightarrow |f(x)| = |(x+2)^x - 1|$

$(x+2)^x - 1 = 0 \Rightarrow x+2 = 1 \Rightarrow x = -2 \rightarrow (-2, +\infty)$

$f(x) = x + \sqrt{x-2} = (\sqrt{x+\frac{1}{4}})^2 - \frac{9}{4} \Rightarrow \sqrt{x+\frac{1}{4}} \geq \frac{3}{2} \Rightarrow x \geq \frac{11}{4}$

$f \circ f(x) \leq f(\sqrt{x}) \Rightarrow f(x) \leq \sqrt{x} \Rightarrow x + \sqrt{x-2} \leq \sqrt{x}$

$0 \leq x \leq 2 \Rightarrow 0 \leq x \leq 2 \rightarrow 0, 1, 2$

$f(x) = \sqrt[3]{9\cos^2 x - 1} - \sqrt[3]{9\cos^2 x + 1} \Rightarrow f(x) = t - \frac{1}{t}$

$\min t \Rightarrow \sqrt[3]{9\cos^2 x - 1} = \sqrt[3]{9\cos^2 x - 1} \Rightarrow \frac{1}{t} = \frac{1}{t} \Rightarrow \frac{1}{t} - t = \frac{2}{t}$

$\max t \Rightarrow \sqrt[3]{9\cos^2 x - 1} = \sqrt[3]{9\cos^2 x - 1} \Rightarrow \frac{1}{t} = \frac{1}{t} \Rightarrow \frac{1}{t} - t = \frac{2}{t}$

$f(x) = x - [x+2] \Rightarrow x - [x] + 2 = f(x) \Rightarrow R_f = [-2, -1]$

$R_f = D_g \Rightarrow g(-2) = \frac{1}{-2} - \frac{1}{-2} = \frac{1}{-2} - \frac{1}{-2} = \frac{1}{-2}$

$g(-1) = \frac{1}{-1} - \frac{1}{-1} = \frac{1}{-1} - \frac{1}{-1} = \frac{1}{-1}$