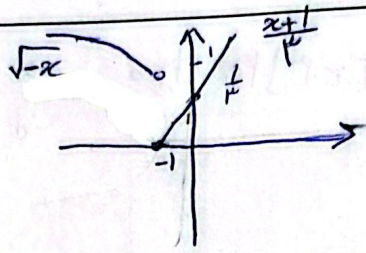


$$x = \begin{cases} 3y-1 & y \geq 0 \\ -y^2 & y > 1 \end{cases}$$



تابع است ✓

$$\begin{aligned} y \geq 0 &\rightarrow x = 3y-1 \rightarrow y = \frac{x+1}{3} \\ y > 1 &\rightarrow x = -y^2 \rightarrow y^2 = -x \rightarrow y = \sqrt{-x} \text{ (غرض)} \\ &\quad +\sqrt{-x} > 1 \rightarrow -x > 1 \rightarrow x < -1 \end{aligned}$$

$$\begin{array}{c|cccccc} x & -4 & -2 & 0 & 2 & 4 & 6 \\ \hline y & -\frac{1}{3} & -\frac{1}{3} & -\frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \end{array}$$

$$f(x) = -\frac{1}{3} \rightarrow f(x) = -\frac{1}{3} \rightarrow f(x) = -\frac{1}{3}$$

$$g(x) = \frac{x^2(x-2)}{f(x)} \rightarrow \frac{x^2(x-2)}{-\frac{1}{3}} \geq 0 \rightarrow D_g = (-4, -2] \cup [2, +\infty)$$

$$f(x) = \frac{x^2(x-2)}{x^3-x} \quad \text{الف)} \quad D_f = x^2(x-2) \neq 0 \rightarrow x(x-2) \neq 0 \rightarrow x \neq 0, 2$$

$$g(x) = \sqrt{\frac{x^2(x-2)}{x^3-x}} \rightarrow \frac{x^2(x-2)}{x^3-x} \geq 0 \quad \begin{array}{c|ccc} x & -2 & 0 & 2 \\ \hline y & -\frac{1}{3} & -\frac{1}{3} & -\frac{1}{3} \end{array}$$

$$D_g = (-2, 0) \cup (2, +\infty)$$

$$\text{الف)} \quad y = \sqrt{\frac{x-2}{x^2(x-2)-1}} \rightarrow \frac{x-2}{x^2(x-2)-1} \geq 0 \quad \begin{array}{c|ccc} x & -2 & 0 & 2 \\ \hline y & -\frac{1}{3} & -\frac{1}{3} & -\frac{1}{3} \end{array}$$

$$D_y = (-2, +\infty) - \{2\}$$

$$\hookrightarrow y = \frac{x^2+1}{x^2-1} \rightarrow x \neq \pm 1 \rightarrow [-x] \neq 1 \quad x \notin [2, 3) \rightarrow x \notin (-2, 2]$$

$$D_y = \mathbb{R} - (-2, 2]$$

$$\text{الف)} \quad f(x) = \frac{\sqrt{x(x^2-1)}}{\sqrt{|x|+x}} \quad x(x^2-1) \geq 0 \quad \begin{array}{c|ccc} x & -1 & 0 & 1 \\ \hline y & -\frac{1}{3} & -\frac{1}{3} & -\frac{1}{3} \end{array} \quad [1, 0] \cup [1, +\infty)$$

$$D_{f(x)} = \mathbb{R} \cap \mathbb{R} = [1, +\infty)$$

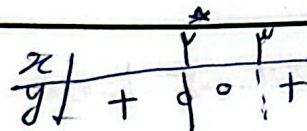
$$\hookrightarrow f(x) = \sqrt{\frac{|x-1|-x^2}{|x|-1}} \rightarrow |x-1| \geq x^2 \rightarrow \begin{cases} x-1 \geq x^2 \rightarrow x^2-x+1 \leq 0 \\ x-1 \leq -x^2 \rightarrow x^2+x-1 \leq 0 \end{cases}$$

$$D_{f(x)} = \mathbb{R} \cap \mathbb{R} = [-2, 1) - \{-1\}$$

$$\begin{array}{c|ccc} x & -2 & -1 & 1 \\ \hline y & -\frac{1}{3} & -\frac{1}{3} & -\frac{1}{3} \end{array} \quad [-2, 1)$$

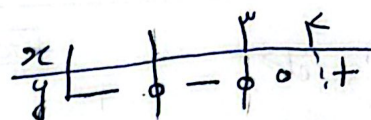
$$\text{أ) } y = \sqrt{(x-2)[x-2]} \rightarrow (x-2)[x-2] \geq 0$$

$$\rightarrow D_y = \mathbb{R}$$



$$\text{ب) } y = \sqrt{|x-1|} \rightarrow [x-1] \geq 0$$

$$\rightarrow D_y = \{1\} \cup [3, +\infty)$$



$$y = \frac{1}{|x-2|-1-K} \rightarrow |x-2|-1 \neq K \rightarrow |x-2|-1 \neq \pm K$$

$$|x-2|=K+1 \rightarrow \begin{cases} x-2=K+1 \rightarrow x=K+3 \\ x-2=-K-1 \rightarrow x=-K+1 \end{cases}$$

$$|x-2|=-K+1 \rightarrow \begin{cases} x-2=1-K \rightarrow x=-K+3 \\ x-2=K-1 \rightarrow x=K+1 \end{cases}$$

$$K+3=-K+3 \rightarrow K=0 \rightarrow x=0, 4$$

$$-K+3=K+1 \rightarrow K=1 \rightarrow x=0, 2 \checkmark$$

$$K+3=-K+1 \rightarrow 2K=-2 \rightarrow K=-1$$

$$|x-2|-1=0 \rightarrow x=1 \text{ (not allowed)}$$

$$f(x) = \frac{\frac{x^2+3x+2}{x^2+2x+1}}{\frac{x+1}{x-1}} \rightarrow \begin{cases} x^2+3x+2 \neq 0 \rightarrow x \neq -1, -2 \\ x-1 \neq 0 \rightarrow x \neq 1 \\ \frac{x+1}{x-1} \neq 0 \rightarrow x \neq -1 \end{cases}$$

$$x \neq -1, -2, 1$$

$$x^2 - 4x + 4 = 0 \rightarrow (x-2)^2 = 0 \rightarrow x=2$$

$$y = \log_{\log x} x \rightarrow x > 0, x \neq 1$$

$$\log x > 0 \rightarrow x > 1, x \neq 1$$

$$\log_{\log x} x > 0 \rightarrow 0 < x < 1$$

$$D_y = (0, 1) \cup (1, +\infty)$$

$$D_{f(x)} = [-a, 3] \rightarrow -a \leq 3x-1 \leq 3 \rightarrow -K \leq 3x \leq K \rightarrow \frac{-K}{3} \leq x \leq \frac{K}{3}$$

$$\rightarrow 2x \leq \frac{K}{3} \rightarrow \frac{2K}{3} < x < \frac{K}{3}$$