

$$a) f(x) = \frac{\sqrt{(x^2-1)x}}{\sqrt{x+1}} > 0$$

$$\Rightarrow x > \frac{-1 \pm \sqrt{1+4}}{2} = \frac{-1 \pm \sqrt{5}}{2}$$

II $\begin{matrix} \oplus \checkmark \\ \ominus X \\ \odot X \end{matrix}$

$$D_f = [1, +\infty) = D_f$$

$$b) f(x) = \frac{\sqrt{(x-1)-x^2}}{|x|-1} \geq 0 \rightarrow x \neq \pm 1$$

$$\Rightarrow |x-1| \geq x^2 \rightarrow D_f = [-1, -1) \cup (-1, 1)$$

$$c) y = \sqrt{(x-1)(x-2)}$$

Call $x=1, 2$

$D_f = \mathbb{R}$

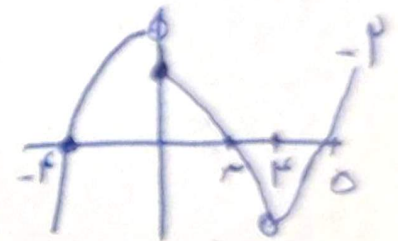
$$d) \sqrt{(x-1)(x-2)}$$

$D_f = [1, 2] \cup [2, +\infty)$

$$x = \begin{pmatrix} y-1 & 1 \\ -y^2 & y \end{pmatrix} \rightarrow y = \frac{x+1}{x} \quad y > 1 \rightarrow y = \sqrt{x} \quad x < 1$$

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

$$g(x) = \frac{\sqrt{x f(x-1)}}{f(x)}$$



$$f(x-1) = 0 \rightarrow x = -1, 2, 3, 4$$

$$f(x) = 0 \rightarrow -1, 2, 3$$

$$D_f = [-1, -1] \cup [0, 2] \cup [4, +\infty)$$

$$f(x) = \frac{x^2 - 1}{x^2 - 1} \quad (x) = x$$

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

$$D_f \subset \mathbb{R} - \{0, 1, -1\}$$

$$\sqrt{\frac{x^2 - 1}{x^2 - 1}} \rightarrow \text{مربع } \Delta < 0$$

$$\frac{x^2 - 1}{x^2 - 1} \rightarrow > 0 \quad - \frac{-1 \pm 1}{1 \pm 1} \neq$$

$$D_f(x) = (-1, 0) \cup (1, +\infty)$$

$$g(x) = y = \sqrt{\frac{x-1}{x^2 - 1}} = \sqrt{\frac{x-1}{(x-1)(x+1)}} = \frac{1}{\sqrt{x+1}}$$

$$\frac{1}{x+1} > 0 \rightarrow D_f = (-1, +\infty) - \{1\}$$

$$\rightarrow y = \frac{x^2 + 1}{x^2 - 1} = \frac{x^2 - 1 + 2}{x^2 - 1} = 1 + \frac{2}{x^2 - 1}$$

$$x \in (-1, 1) \rightarrow D_f = \mathbb{R} - (-1, 1)$$

$$y = \frac{1}{|x-1| - 1 - k} \quad -1$$

$$|x-1| - 1 \neq k \rightarrow |x-1| \neq k+1 \rightarrow x \neq k+1$$

$$|x-1| \neq 1-k \rightarrow x \neq k$$

$$-k+1, k+1 \rightarrow \boxed{k \neq 1}$$

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

$$\frac{x+1}{x-1} \neq 0 \rightarrow x \neq -1$$

$$\underline{x \neq 1}$$

$$x \neq -1, -1, 1 \rightarrow x = 1$$

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

$$y = \log_{a+1} \log_{a+1} \frac{1}{x} \quad \textcircled{1} a \neq 0, 1$$

$$\textcircled{2} 0 < a < 1 \quad \textcircled{3} a > 0, a+1 > 0$$

$$\textcircled{4} a > 1$$

$$\textcircled{1} \cap \textcircled{2} \cap \textcircled{3} \cap \textcircled{4} \rightarrow D_f = (0, 1)$$

D1

$$f(x) = [-1, 1]$$

-1

$$D) f(x_{n-1}) \rightarrow -0.5 \leq x_{n-1} \leq 0.5$$

$$-1 \leq x_{n-1} \leq 1$$

$$\frac{-1}{\sqrt{1}} \leq x \leq \frac{1}{\sqrt{1}} \quad x \geq \frac{1}{\sqrt{1}} \quad \text{or} \quad x \leq \frac{1}{\sqrt{1}}$$

$$D) f(x_{n-1}) = \left[\frac{-1}{\sqrt{1}}, \frac{1}{\sqrt{1}} \right]$$