

19, 25 آفرین

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$$f(x) = \sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \quad \begin{matrix} x \neq 0 \\ x \neq 1 \end{matrix} \quad \left\{ \begin{matrix} f(x) = \sqrt{\frac{(x-1)^2 - x^2}{x(x-1)}} \rightarrow \frac{0}{0} \end{matrix} \right.$$

$$\rightarrow \frac{\frac{1}{x-1} - \frac{x}{x}}{\frac{x}{x-1} + \frac{1}{x-1}} \quad \begin{matrix} x \neq 0 \\ x \neq 1 \\ x \neq -1 \end{matrix} \quad \Rightarrow \frac{\frac{1}{x-1} - \frac{x}{x}}{\frac{x}{x-1} + \frac{1}{x-1}} \neq 0 \Rightarrow \frac{x+1}{(x+1)(x-1)} \neq 0 \Rightarrow \frac{x+1}{(x+1)(x-1)} \neq 0$$

$D_f = \mathbb{R} - \{0, 1, -1, \frac{1}{x-1}\}$

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$$f(x) = \sqrt{((\frac{1}{x})^2 - 9)(x-1)} \quad \frac{0}{0} \quad D_f = (-\infty, -1) \cup (1, +\infty)$$

$$\rightarrow \sqrt{y+1} \leq x - \sqrt{x-1} \quad \begin{matrix} x-1 \geq 0 \Rightarrow x \geq 1 \\ x - \sqrt{x-1} \geq 0 \Rightarrow x \geq \sqrt{x-1} \Rightarrow x-1 \leq 1 \Rightarrow x \leq 2 \end{matrix}$$

$$D_f = [1, 2]$$

$$f(x) = \frac{\log_e(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1} \quad \begin{matrix} x^2 - x - 2 > 0 \Rightarrow \frac{-1}{2} < x < 2 \\ x^2 - 1 \geq 0 \Rightarrow x \geq 1, x \leq -1 \end{matrix} \quad D_f = (-\infty, -1) \cup (2, +\infty)$$

$$y = \sqrt{-x^2 - 4x + 4} \quad \frac{-2}{-1} \leq x \leq 2 \Rightarrow b \leq 1, c \leq 2 \Rightarrow a \leq b \leq 1$$

$$g(x) = \sqrt{f(x) - x} \Rightarrow f(x) - x \geq 0 \Rightarrow \begin{matrix} 2x - 2 \geq 0 \Rightarrow x \geq 1, x \geq 1 \\ x + c \geq 0 \Rightarrow x \geq -c, x \leq 1 \end{matrix}$$

$$\Rightarrow D_f = [-c, +\infty)$$

$$\sin \frac{\pi}{6} + \cos \frac{\pi}{6} = \frac{\sqrt{2}}{2} \rightarrow f(x) = x(\sqrt{x} - \sqrt{x}) = \frac{(\sqrt{x} - \sqrt{x})(\sqrt{x} - \sqrt{x})}{x} = \frac{0}{x} = 0$$

$$f(x) = \frac{a+1}{a-1} \quad a \neq 1 \quad f(f(x)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{a+1}{a-1} \Rightarrow a \in \mathbb{R} - \{1\}$$

$$t^2 - 4t + 4 = 0 \Rightarrow (t-2)^2 = 0 \Rightarrow t = 2$$

$$\sqrt{a^2 - 1} = 1 \Rightarrow a^2 = 2 \Rightarrow a = \pm \sqrt{2}$$

$$f(-4+4) \times f(1+4) = ((-4)^2 - 4(-4) + 4)(1 - 4 + 4) = 1 \times 1 = 1$$

$$t^2 + at - 4a = 0 \Rightarrow t^2 + at - 1 = 0 \Rightarrow t = \frac{-a \pm \sqrt{a^2 + 4}}{2}$$

$$\Rightarrow \cos x = \frac{1}{\sqrt{2}} \Rightarrow x = \frac{\pi}{4} \text{ or } \frac{7\pi}{4} \Rightarrow \tan x = (1)^2 = 1$$

$$C \cdot \sin u = \frac{1}{\sqrt{2}} \rightarrow u = \frac{\pi}{4} \leq \frac{2\pi}{\sqrt{2}} \therefore$$

$$2K\pi - \frac{\pi}{\sqrt{2}} \leq 2K\pi + \frac{\pi}{\sqrt{2}} \rightarrow \tan u = \pm \sqrt{2} \rightarrow \tan^2 u = 2$$

$$f(\sqrt{2} \cos u + 2 \sin u) = f(1, 0) \rightarrow \sqrt{2} \cos u + 2 \sin u = 1, 0 \rightarrow \sqrt{2} \cos u + 2 \sin u = \frac{1}{\sqrt{2}} \therefore -1$$

$$C \cdot \sin u = \frac{-2 \pm \sqrt{4 + 2}}{\sqrt{2}} \Rightarrow C \sin u = \frac{-2 + 2}{\sqrt{2}} = \frac{0}{\sqrt{2}} = 0$$

$$\hookrightarrow C \cdot \sin u = \frac{-2 - 2}{\sqrt{2}} = -\frac{4}{\sqrt{2}} = -2\sqrt{2} \times C \cdot \sin u = -$$

$$\text{result: } C \cdot \frac{\pi}{\sqrt{2}} = \frac{1}{\sqrt{2}}, C \cdot \frac{2\pi}{\sqrt{2}} = \frac{1}{\sqrt{2}} \rightarrow f(1, 0) = 1$$

$$\downarrow \quad \downarrow$$

$$\tan u = (\sqrt{2})^2 = 2 \quad \tan u = (-\sqrt{2})^2 = 2$$