

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

$$\rightarrow D_f = (-\infty, 0) \cup \left(\frac{1}{2}, 1\right)$$

$$\rightarrow f(x) = \frac{\frac{1}{x-1} - \frac{x}{x}}{\frac{x}{x-1} + \frac{1}{x+2}} \rightarrow \begin{cases} x \neq -1, x \neq 0 \\ x \neq 1, x \neq -2 \\ \frac{x}{x-1} + \frac{1}{x+2} \neq 0 \rightarrow \frac{x(x+2) + x-1}{(x-1)(x+2)} \neq 0 \rightarrow \frac{x^2+3x-1}{(x-1)(x+2)} \neq 0 \rightarrow x \neq \frac{-3 \pm \sqrt{17}}{2} \end{cases}$$

$$\rightarrow D_f = \mathbb{R} - \left\{-2, -\frac{3}{2}, -1, 0, 1\right\}$$

$$f(x) = \sqrt{\left(\left(\frac{1}{x}\right)^2 - 9\right)(3x - x^2)} \rightarrow \left(\left(\frac{1}{x}\right)^2 - 9\right)(3x - x^2) \geq 0 \rightarrow (x^{-2} - 9)(3x - x^2) \geq 0$$

$$\frac{-x}{x} - \frac{9}{x} \rightarrow D_f = (-\infty, -2] \cup \left[\frac{2}{3}, +\infty\right)$$

$$\rightarrow \sqrt{x-1} + \sqrt{y+1} = 3 \rightarrow x-1 \geq 0 \rightarrow x \geq 1$$

$$\hookrightarrow \sqrt{x-1} - 3 \leq -\frac{\sqrt{y+1}}{3} \rightarrow \sqrt{x-1} - 3 \leq 0 \rightarrow \sqrt{x-1} \leq 3 \rightarrow x-1 \leq 9 \rightarrow x \leq 10$$

$$\rightarrow D_f = [1, 10]$$

$$f(x) = \frac{\log_e(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1} \rightarrow \begin{cases} x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0 \rightarrow \frac{-1}{+1-1+} \rightarrow (-\infty, -1) \cup (2, +\infty) \\ x^2 - 1 \geq 0 \rightarrow x \geq 1, x \leq -1 \end{cases}$$

مخرج صفر نشود.

$$\rightarrow D_f = (-\infty, -1) \cup (2, +\infty)$$

$$f(x) = \sqrt{3+ax-x^2} \xrightarrow{x=-2} 3-2a-4=0 \rightarrow a = -\frac{1}{2}$$

$$\rightarrow f(x) = \sqrt{-x^2 - \frac{1}{2}x + 3} \rightarrow -x^2 - \frac{1}{2}x + 3 \geq 0 \rightarrow -(x+2)(x-\frac{3}{2}) \geq 0 \rightarrow D_f = [-2, \frac{3}{2}] \rightarrow b = \frac{3}{2}$$

$$\rightarrow a+b = -\frac{1}{2} + \frac{3}{2} = 1$$

$$f(x) = x \geq 0 \rightarrow f(x) \geq x \rightarrow \begin{cases} 4x-2 \geq x \rightarrow 3x \geq 2 \rightarrow x \geq \frac{2}{3} \\ 2x+3 \geq x \rightarrow x \geq -3 \rightarrow -3 \leq x < 1 \end{cases}$$

$$\rightarrow D_g = [-3, +\infty)$$

$$f(\sin \frac{\pi}{4} + \cos \frac{\pi}{4}) = f(\sin 45^\circ + \cos 45^\circ) = f(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}) = f(1 + \frac{\sqrt{2}}{2})$$

$$\rightarrow f(n) = r n (n-r)$$

$$\rightarrow f\left(\frac{r+\sqrt{r}}{r}\right) = r + \sqrt{r} \left(\frac{\sqrt{r}}{r} - 1\right) \rightarrow \sqrt{r} + \frac{r}{r} - r - \sqrt{r} = \boxed{\frac{-1}{r}}$$

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$$f(a) = \frac{a+1}{a-1} \rightarrow f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{2a}{a-1}}{\frac{2}{a-1}} = a$$

$$\rightarrow a \in \mathbb{R} - \{1\}$$

Y

$$f(x) = -x \rightarrow x^r - x = -x \rightarrow x^r - x + x = 0 \rightarrow (x-r)^r = 0 \rightarrow x=r$$

$$\rightarrow g(a) = r \rightarrow \sqrt{a^r - 1} = r \rightarrow a^r - 1 = r^2 \rightarrow a = \pm \sqrt[r]{r^2 + 1}$$

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$$n=1 \rightarrow f(z) = 1 - 0 + 4 = 1$$

$$x = -4 \rightarrow f(-4) = 3(-4) + 10 + 4 = 14$$

$$f(z) \times f(-z) = 1 \times 1 = \underline{122}$$

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$$\sum \cos^n n + a \cos n = 1/\omega \rightarrow \sum \cos^n n + a \cos n - \frac{1}{f} = 0 \rightarrow \cos^n n + a \cos n - 1/2 = 0$$

$$\rightarrow (\cos n + \frac{v}{2}) (\cos n - \frac{v}{2}) = 0 \rightarrow \cos n = -\frac{v}{2} \rightarrow \text{غير قابل قبول}$$

$$\hookrightarrow \cos n = \frac{1}{2} \checkmark$$

$$\frac{1}{\cos^2 n} = 1 + \tan^2 n \rightarrow \tan^2 n = 2 - 1 = \boxed{1}$$

1.