

$$f(x) = \sqrt{3+ax-x^2} \quad [-r, b]$$

$$3+ax-x^2 \geq 0 \Rightarrow -(x^2-ax-\frac{3}{1}) \geq 0 \Rightarrow$$

$$\text{معرفه: } -\frac{b}{a} \Rightarrow -\frac{a}{-1} = a \quad \text{ضرب: } \frac{c}{a} = \frac{3}{-1} = -3$$

$$-(x^2+3)(x-\frac{3}{1}) \Rightarrow -(x^2+ax-3) \quad \begin{array}{c} -3 \quad \frac{3}{1} \\ + \quad | \quad - \quad | \quad + \end{array}$$

$$a+b = -3, a+1, a = 1$$

$$\sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \Rightarrow \frac{x-1}{x} - \frac{x}{x-1} \Rightarrow \frac{(x-1)^2 - x^2}{x(x-1)} \Rightarrow \quad \text{الف-1}$$

$$\frac{-2x+1}{x(x-1)} \geq 0 \quad x = 1, \frac{1}{2}, 0 \quad \begin{array}{c} 0 \quad \frac{1}{2} \quad 1 \\ - \quad | \quad + \quad | \quad - \quad | \quad + \end{array} \Rightarrow$$

$$D_f = (0, \frac{1}{2}] \cup (1, +\infty)$$

$$\begin{aligned} \frac{1}{x+1} - \frac{2}{x} &\Rightarrow \text{مخرج: } \frac{x-2(x+1)}{x(x+1)} = \frac{-x-2}{x(x+1)} \\ \frac{3}{x-1} + \frac{1}{x+2} &\Rightarrow \text{مخرج: } \frac{3(x+2)+(x-1)}{(x-1)(x+2)} = \frac{4x+5}{(x-1)(x+2)} = \frac{-(x+2)^2(x-1)}{x(x+1)(4x+5)} \end{aligned} \quad \text{ب}$$

$$R = \{-2, -1, -\frac{5}{4}, 0, 1\}$$

$$f(x) = \begin{cases} r x - r & x \geq 1 \\ r x + r & x < 1 \end{cases}$$

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

$$f(x) - x \geq 0 \Rightarrow r x - r \geq x \Rightarrow r x \geq r \Rightarrow x \geq 1$$

$$r x + r \geq x \Rightarrow x \geq -r$$

$$D_g = [-r, +\infty)$$

$$\sqrt{\left(\left(\frac{1}{r}\right)^x - 9\right)(rr - \varepsilon^x)}$$

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$$\left(\left(\frac{1}{r}\right)^x - 9\right)(rr - \varepsilon^x) \geq 0 \quad \left(\frac{1}{r}\right)^x = 9 \Rightarrow \left(\frac{1}{r}\right)^x \neq 9 \Rightarrow x = -r$$

$$rr - \varepsilon^x = 0 \Rightarrow rr = \varepsilon^x \Rightarrow x = \frac{r}{r}$$

$$D_f = \left[-r, \frac{0}{r}\right]$$

$$\frac{-r}{-} + \frac{\frac{0}{r}}{+}$$

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$$\sqrt{x-1} + \sqrt{y+1} = r \Rightarrow x-1 \geq 0 \Rightarrow x \geq 1 \quad y+1 \geq 0 \Rightarrow y \geq -1 \quad (ب)$$

$$\sqrt{y+1} = r - \sqrt{x-1} \Rightarrow r - \sqrt{x-1} \geq 0 \Rightarrow \sqrt{x-1} \leq r \Rightarrow$$

$$x-1 \leq r^2 \Rightarrow x \leq r^2$$

$$x = [1, r^2]$$

$$f(x) = x^2 - \varepsilon x \quad g(x) = \sqrt{x^2 - 1}$$

-A

$$f(g(a)) = (g(a))^2 - \varepsilon(g(a)) = (\sqrt{a^2 - 1})^2 - \varepsilon\sqrt{a^2 - 1} = a^2 - 1 - \varepsilon\sqrt{a^2 - 1} = -\varepsilon$$

$$\Rightarrow (a^2 - 1 - \varepsilon\sqrt{a^2 - 1})^2 = 0 \Rightarrow a^4 + 4a^2 + 9 = 14a^2 - 14 \Rightarrow a^4 - 10a^2 + 14 = 0$$

$$(a^2 - 5)^2 = 0 \Rightarrow a^2 = 5 \Rightarrow \boxed{a = \pm\sqrt{5}}$$

$$f(x) = \frac{x+1}{x-1} \quad f(f(a)) = a$$

-V

$$f(f(x)) = f\left(\frac{x+1}{x-1}\right) = \frac{\frac{x+1}{x-1} + 1}{\frac{x+1}{x-1} - 1} \Rightarrow \frac{x+1 + (x-1)}{x-1} = \frac{2x}{x-1}$$

$$\text{for } \frac{x+1 - (x-1)}{x-1} = \frac{2}{x-1} \Rightarrow \frac{\frac{2x}{x-1}}{\frac{2}{x-1}} = x \Rightarrow x \neq 1$$

$$\boxed{1} \leftarrow x-1$$

$$\Rightarrow f(f(a)) = a \Rightarrow \boxed{a \in \mathbb{R} - \{1\}}$$

$$f(x) = 2x^2 - \varepsilon x \quad f\left(\sin \frac{\pi}{\sqrt{2}} + \cos 2\pi\right)$$

-4

$$\sin \frac{\pi}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad \cos 2\pi = 1 \Rightarrow x = \frac{\sqrt{2}}{2} + 1$$

$$f(x) = 2x^2 - \varepsilon x = 2x(x - \varepsilon) \Rightarrow 2\left(\frac{\sqrt{2}}{2} + 1\right)\left(\frac{\sqrt{2}}{2} + 1 - \varepsilon\right)$$

$$2\left(\frac{\sqrt{2}}{2} - 1\right)^2 = 2\left(\frac{2}{2} - 1\right) = 2\left(-\frac{1}{2}\right) = \boxed{-1}$$

B. $\sin \frac{\pi}{\sqrt{2}}$

$$f(\epsilon \cos^2 x + \Delta \cos x) = \tan^2 x$$

-10

$$\cos^2 x + \Delta \cos x = 1, \Delta \Rightarrow (\epsilon \cos^2 x + \Delta \cos x - 1, \Delta = 0) \times 1 \Rightarrow$$

$$1 \cos^2 x + 10 \cos x - 1 = 0 \Rightarrow \frac{-10 \pm \sqrt{100 + 4 \cdot 1 \cdot 1}}{2} \Rightarrow \frac{-10 \pm 11}{2} \Rightarrow$$

$$\cos x_1 = \frac{1}{2} = \frac{1}{2}, \cos x_2 = \frac{-11}{2} = -1, \text{ valid } x$$

$$\tan^2 x = \frac{1 - \cos^2 x}{\cos^2 x} = \frac{1 - \left(\frac{1}{2}\right)^2}{\left(\frac{1}{2}\right)^2} = \frac{1 - \frac{1}{4}}{\frac{1}{4}} = \frac{\frac{3}{4}}{\frac{1}{4}} = 3 \Rightarrow \boxed{3}$$

$$f(x+1) = x^2 - \Delta x + 9$$

$$f(\epsilon) \times f(-3)$$

-9

$$\left. \begin{array}{l} x+1 = \epsilon \Rightarrow x=1 \Rightarrow 1 - \Delta + 9 = 1 \\ x+1 = -3 \Rightarrow x=-4 \Rightarrow 16 - 4\Delta + 9 = 1 \end{array} \right\} \Delta \times \Delta = \boxed{1 \times 1}$$

$$\frac{\log \varepsilon (x^Y - x^{-Y})}{\sqrt{x^Y - 1} + 1}$$

$$\Rightarrow x^Y - x^{-Y} > 0 \Rightarrow (x - Y)(x + 1) > 0$$

$$\Rightarrow \begin{array}{c|c|c} -1 & 1 & -1 \\ \hline + & - & + \end{array}$$

$$\sqrt{x^Y - 1} + 1 \neq 0 \Rightarrow \sqrt{x^Y - 1} \neq -1 \Rightarrow \text{Can't be } -1 \Rightarrow R$$

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