

$$f(f(\frac{\pi}{4}))$$

$$f(\frac{\pi}{4}) = 0 + \frac{\pi}{4} = \sqrt{3}$$

$$f(\sqrt{3}) = \sqrt{(\sqrt{3})^2 + 1} = \boxed{2}$$

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$$f(g(\frac{\pi}{3}))$$

$$2 \cos^2(\frac{\pi}{3}) = \frac{1}{2}$$

$$x = \frac{1}{2} \rightarrow f(\frac{1}{2}) = \sqrt{\frac{x-1}{x}} = \sqrt{\frac{\frac{1}{2}-1}{\frac{1}{2}}} = \sqrt{\frac{-\frac{1}{2}}{\frac{1}{2}}} = \boxed{\frac{\sqrt{3}}{2}}$$

(الف)

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$$g(\sqrt{2}) \Rightarrow \frac{\sqrt{2}}{1-\sqrt{2}} \times \frac{1+\sqrt{2}}{1+\sqrt{2}} = \frac{\sqrt{2}+2}{-1} = -2-\sqrt{2} \approx -3.4 \rightarrow f(x) \Rightarrow$$

$$f(x) \Rightarrow [-2-\sqrt{2}] = \boxed{-4}$$

(ب)

$$f(\frac{\pi}{2}) \rightarrow \sin \frac{\pi}{2} = \frac{\sqrt{2}}{2}$$

$$g(\frac{\sqrt{2}}{2}) = \sqrt{1 - \frac{1}{2}} = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} = \boxed{\frac{1}{2}}$$

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(الف)

$$\begin{matrix} \varepsilon \rightarrow 4 \rightarrow 5 \\ 2 \rightarrow \varepsilon \rightarrow 5 \end{matrix}$$

$$\begin{matrix} 4 \rightarrow 8 \rightarrow 15 \\ 8 \rightarrow 10 \rightarrow 15 \end{matrix}$$

$$f \circ g = \{(2, 5), (4, 5), (4, 15), (8, 15)\}$$

(ب)

$$\begin{matrix} \varepsilon \rightarrow 5 \rightarrow x \\ 4 \rightarrow 5 \rightarrow y \end{matrix}$$

$$\begin{matrix} 8 \rightarrow 15 \rightarrow x \\ 10 \rightarrow 15 \rightarrow x \end{matrix}$$

$$g \circ f = \emptyset$$

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$$\begin{matrix} \varepsilon \rightarrow 5 \rightarrow x \\ 4 \rightarrow 5 \rightarrow x \end{matrix}$$

$$\begin{matrix} 8 \rightarrow 15 \rightarrow x \\ 10 \rightarrow 15 \rightarrow x \end{matrix}$$

$$f \circ f = \emptyset$$

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$$\begin{matrix} \varepsilon \rightarrow 4 \rightarrow 8 \\ 2 \rightarrow \varepsilon \rightarrow 4 \end{matrix}$$

$$\begin{matrix} 8 \rightarrow 10 \rightarrow x \\ 4 \rightarrow 8 \rightarrow 10 \end{matrix}$$

$$g \circ g = \{(\varepsilon, 8), (2, 4), (4, 10)\}$$

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$$f \circ g = \begin{matrix} 1 \rightarrow 2 \rightarrow 1 \\ 3 \rightarrow 1 \rightarrow 2 \\ 4 \rightarrow 3 \rightarrow 2 \\ 5 \rightarrow 4 \rightarrow 1 \end{matrix} \rightarrow \{(1, 1), (3, 2), (4, 2), (5, 1)\}$$

$$\left. \begin{matrix} (2, 2) \rightarrow \boxed{a=2} \\ (4, 2) \rightarrow \boxed{b=5} \end{matrix} \right\} (a, b) \rightarrow \boxed{(2, 5)}$$

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$$g \circ f = \begin{matrix} 2 \rightarrow 1 \rightarrow 2 \\ 3 \rightarrow 2 \rightarrow x \\ 4 \rightarrow 5 \rightarrow 2 \\ 1 \rightarrow 4 \rightarrow x \end{matrix}$$

$$\rightarrow \{(2, 2), (4, 2)\} \rightarrow \boxed{b=5}$$

$$g(f(m)) \rightarrow \frac{1}{x+|m| - i\sqrt{x+|m|}} \rightarrow (|m|+x)^r \neq (\epsilon\sqrt{x+|m|})^r$$

$$\frac{x^r + x}{x^r} \neq \frac{\epsilon\sqrt{x+|m|}}{\epsilon} \rightarrow x \neq A x \rightarrow x \neq 0$$

$$x \neq A$$

$$D_f = \mathbb{R} - \{0, A\}$$

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