

$$f(f(\frac{\pi}{4})) = f(\sqrt{2}) = 2$$

$$f(\frac{\pi}{4}) = \frac{\cos \pi \times \frac{\pi}{4}}{\pi} = \frac{\cos \pi}{4} = \sqrt{2}$$

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

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$$f(g(\sqrt{2}))$$

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

$$f(-2-\sqrt{2}) = \left[\underbrace{-2-\sqrt{2}}_{\frac{1}{2}} \right] = -4$$

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

$$g(\frac{\pi}{4}) = \cos \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$f(\frac{1}{\sqrt{2}}) = f(2) = \sqrt{\frac{2-1}{2}} = \frac{\sqrt{2}}{2}$$

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$$g(f(\frac{\pi}{4})) = g(\frac{\sqrt{2}}{2}) = \frac{1}{2}$$

$$f(\frac{\pi}{4}) = \sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$$

$$g(\frac{\sqrt{2}}{2}) = \frac{\sqrt{2}}{2} \sqrt{1-\frac{\sqrt{2}}{2}} = \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} = \frac{2}{4} = \frac{1}{2}$$

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$$f \rightarrow \omega \quad \times$$

$$4 \rightarrow a \quad \times$$

$$1 \rightarrow 12 \quad \times$$

$$10 \rightarrow 12 \quad \times$$

$$g(f(x)) = \emptyset$$

$$f \rightarrow 4 \rightarrow \omega$$

$$2 \rightarrow 4 \rightarrow \omega$$

$$4 \rightarrow 1 \rightarrow 12$$

$$1 \rightarrow 10 \rightarrow 12$$

$$f(g(x)) = \{(t, \omega), (t, \omega), (4, 12), (10, 12)\}$$

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$$f \rightarrow 4 \rightarrow 1$$

$$2 \rightarrow 4 \rightarrow 1$$

$$4 \rightarrow 1 \rightarrow 10$$

$$1 \rightarrow 10 \rightarrow \times$$

$$g(g(x)) = \{(t, 1), (4, 4), (4, 10)\}$$

$$f \rightarrow \omega \quad \times$$

$$4 \rightarrow \omega \quad \times$$

$$1 \rightarrow 12 \quad \times$$

$$10 \rightarrow 12 \quad \times$$

$$f(f(x)) = \emptyset$$

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$$f \circ g \begin{cases} 1 \rightarrow 2 \rightarrow 1 \\ 2 \rightarrow 1 \rightarrow 4 \\ a \rightarrow 2 \rightarrow 2 \rightarrow (a, 2) = (t, 2) \rightarrow a = 2 \\ b \rightarrow 1 \rightarrow 4 \rightarrow (b, 4) \neq (t, 2) \times \end{cases}$$

$$(a, b) = (t, \omega)$$

$$g \circ f \begin{cases} 2 \rightarrow 1 \rightarrow 2 \\ 2 \rightarrow 2 \\ t \rightarrow \omega \rightarrow 1 \rightarrow (t, 1) \rightarrow (b, 1) = (a, 1) \quad b = \omega \\ 1 \rightarrow 4 \end{cases}$$

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$$g(x, y) = x - y \quad x + y = t \quad x = \frac{t-y}{2} \quad g(t) = \frac{t-y}{2} - y = \frac{t-3y}{2} \quad g(x) = \frac{x-3y}{2}$$

$$f(x) = ax + b \rightarrow f(ax+b) = \frac{t-x}{2} \rightarrow \underbrace{a(ax+b)+b}_{a^2x+ab+b = t-x} \quad a^2 = t \quad \left\{ \begin{array}{l} a = -2 \quad f(x) = -2x-3 \\ a = 2 \quad f(x) = 2x+1 \end{array} \right\} \quad f(-1) = -1$$

$$g(f(x)) = g(f(-1)) = g(-1) = \frac{-1-3}{2} = -2$$

$$D_{g \circ f} = \{x \in D_f, f(x) \in D_g\}$$

$R(\omega)$

$$\sqrt{x+1} \neq x+1 \quad x+1 \neq \leftarrow$$

$$-x \neq |x| \quad x \neq 0 \quad (x)$$

$$\sqrt{x+1} \neq x+1 \quad x+1 \neq 1 \quad x \neq 0 \quad (x)$$

$$D_{g \circ f} = (1) \cap (2) = (0, +\infty) - \{1\}$$

$$f \circ f + f \circ g$$

$$f \circ f = \sqrt{1+x} = \sqrt{x^2} = |x| \quad D = [0, +\infty) \quad (1)$$

$$g \circ f = \sqrt{1-x} \rightarrow 1-x \geq 0 \rightarrow x \leq 1 \quad (2)$$

$$(1) \cap (2) = [0, 1]$$

$$f\left(x + \frac{1}{x}\right) = x^2 + \frac{1}{x^2} \quad x + \frac{1}{x} = t$$

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

$$f(t) = t^2 - x \rightarrow f(x) = x^2 - x$$

$$\left(\begin{array}{l} f\left(\frac{x+1}{x}\right) = f(x) + \omega \\ \frac{x+1}{x} = t \\ x = \frac{t+1}{t-1} \end{array} \right) \quad (2)$$

$$f(t) = f\left(\frac{t+1}{t-1}\right) + \omega = \frac{1}{t-1} + \frac{1}{t-1} + \omega = \frac{2}{t-1} + \omega$$

$$= \frac{1^2 t - 1}{t-1}$$

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

$$f(x) = x\sqrt{x} \quad \left\{ \begin{array}{l} x\sqrt{x} = 1 \rightarrow x = 1 \\ x\sqrt{x} = 2\sqrt{2} \rightarrow x = 2 \end{array} \right.$$

$$x=1$$