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$$\left[\cos \sqrt{x} = \cos \frac{\pi}{6} = \cos \frac{\pi}{2} \times \frac{\sqrt{2}}{2} \rightarrow \cos \frac{\pi}{2} < 1 \rightarrow f\left(\frac{\pi}{2}\right) \rightarrow f\left(\frac{\pi}{2}\right) \rightarrow f(\sqrt{2}) \Rightarrow \sqrt{2} > 1 \rightarrow \sqrt{2+1} = \sqrt{3+1} = \sqrt{4} = 2 \checkmark$$

$$\Rightarrow f\left(\frac{\pi}{2}\right) = \left\{ \left(\frac{\pi}{2}, 2 \right) \right\}$$

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$$\left[\cos \frac{\pi}{2} = \cos 90^\circ = 0 \times \frac{1}{2} = \frac{1}{2} \right] \rightarrow f\left(\frac{\pi}{2}\right) \rightarrow f\left(\frac{\pi}{2}\right) = \cos \frac{\pi}{2} = 0 \rightarrow f\left(\frac{\pi}{2}\right) = 0 \rightarrow f\left(\frac{1}{2}\right) \rightarrow x=2 \rightarrow \sqrt{\frac{2 \times 2 - 1}{2 \times 2}} = \sqrt{\frac{4-1}{4}} = \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2} \rightarrow \left\{ \left(\frac{\pi}{2}, \frac{\sqrt{3}}{2} \right) \right\} \checkmark$$

$$f(\sqrt{2}) \rightarrow f(\sqrt{2}) = \frac{\sqrt{2}}{1+\sqrt{2}} \times \frac{1+\sqrt{2}}{1+\sqrt{2}} = \frac{\sqrt{2}+2}{1-2} = -\sqrt{2}-2 = -1, 4-2 = -3 \checkmark$$

$$\rightarrow f(-3, 4) = [-3, 4] = -4 \rightarrow \left\{ (\sqrt{2}, -4) \right\} \checkmark$$

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$$f\left(\frac{\pi}{4}\right) \rightarrow f\left(\frac{\pi}{4}\right) = \sin \frac{\pi}{4} = \sin 45^\circ = \frac{\sqrt{2}}{2} \rightarrow f\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2} \rightarrow f\left(\frac{1}{2}\right) = \frac{\sqrt{2}}{2} \sqrt{1-\frac{1}{4}} = \frac{\sqrt{2}}{2} \sqrt{\frac{3}{4}} = \frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{6}}{4} \rightarrow \left\{ \left(\frac{\pi}{4}, \frac{\sqrt{6}}{4} \right) \right\} \checkmark$$

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$$f(1) \rightarrow \left\{ (1, 2), (2, 4), (4, 8) \right\} \checkmark$$

$$f(2) \rightarrow \left\{ (2, 4) \right\} \checkmark$$

$$f(4) \rightarrow \left\{ (4, 8) \right\} \checkmark$$

$$f(8) \rightarrow \left\{ (8, 16) \right\} \checkmark$$

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$$(4, 2) \in f \rightarrow f(4, 2) \rightarrow (2, 4) \rightarrow (4, 2) \rightarrow a = 4 \checkmark$$

$$(4, 1) \in g \rightarrow f(4, 1) \rightarrow (1, 4) \rightarrow (4, 1) \rightarrow b = 5 \checkmark$$

$$(a, b) = (4, 5) \checkmark$$

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$$f(a) \rightarrow a+b \rightarrow f(f(a)) = f(a+b) = a(ab)+b = a^2n+ab+b = a^2n+ab+b = a^2n+ab+b(a)$$

$$\rightarrow a^2 = 1 \rightarrow a = \pm 1 \rightarrow b(a+1) = 1 \rightarrow a = 1 \rightarrow b = 1$$

$$\rightarrow a = -1 \rightarrow b = -1$$

$$f \in 1) \rightarrow -1 \times 1 + 1 = -1 + 1 = 0 \rightarrow 1 \times 1 + 1 = 2 \rightarrow 1 \times 1 = 1 \rightarrow 1 \times 1 = 1 \rightarrow 1 \times 1 = 1$$

$$\rightarrow -1 \times -1 - 1 = 1 - 1 = 0 \rightarrow 1 \times -1 - 1 = -2 \rightarrow 1 \times -1 = -1 \rightarrow 1 \times -1 = -1$$

$$\rightarrow -1 \times -1 - 1 = 1 - 1 = 0 \rightarrow 1 \times -1 - 1 = -2 \rightarrow 1 \times -1 = -1 \rightarrow 1 \times -1 = -1$$

$$\rightarrow \{-1, 1\}$$

$$f \circ f(n) \rightarrow D_{f \circ f} = \{n \in D_f \cap f(n) \in D_f\}$$

$$f(n) = \sqrt{n+1} \rightarrow n \geq 0 \rightarrow f(n) \geq 0$$

$$\rightarrow n < 0 \rightarrow f(n) < 0$$

$$\rightarrow n > 0 \rightarrow f(n) = \sqrt{n}$$

$$D_f = \mathbb{R} \checkmark$$

$$g(n) = \frac{1}{n-1} \rightarrow n \neq 1$$

$$n(n-1) \neq 0 \rightarrow n \neq 0, 1$$

$$D_g = \mathbb{R} - \{0, 1\}$$

$$D_{f \circ g} = \{n \in D_g \cap f(n) \in D_g\}$$

$$D_{f \circ g} = \{n \in \mathbb{R} \cap \sqrt{n+1} \in \mathbb{R} - \{0, 1\}\}$$

$$(0, +\infty) - \{1\}$$

$$D_{f \circ g} = \mathbb{R} - \{0, 1\}$$

$$\rightarrow \begin{cases} f(n) \neq 0 \rightarrow n > 0 \\ f(n) \neq 1 \rightarrow n \neq 1 \end{cases}$$

$$D_g = n > 0 \checkmark$$

$$D_f = n < 1 \rightarrow |n| < 1$$

$$D_{f+g} \rightarrow D_f \cap D_g = \{n \in \mathbb{R} \mid 0 < n < 1\}$$

$$D_{(f+g) \circ f} = \{n \in D_f \cap f(n) \in D_{f+g}\} = \{n \in \mathbb{R} \mid 0 < n < 1 \cap 0 < \sqrt{n+1} < 1\}$$

$$0 < \sqrt{n+1} < 1 \rightarrow 0 < 1-n < 1 \rightarrow -1 < -n < 0 \rightarrow 0 < n < 1$$

$$D_{(f+g) \circ f} = (0, 1)$$

$$f\left(\frac{1}{n}\right) = \frac{1}{n+1} \rightarrow \frac{1}{n+1} = \frac{1}{n+1} \rightarrow \frac{1}{n+1} = \frac{1}{n+1} \rightarrow \frac{1}{n+1} = \frac{1}{n+1}$$

$$\rightarrow n(1-b) = -(1+b) \rightarrow n = \frac{1+b}{b-1} \rightarrow \frac{1+b}{b-1} = \frac{1+b}{b-1} \rightarrow \frac{1+b}{b-1} = \frac{1+b}{b-1}$$

$$\rightarrow \frac{1+b}{b-1} = \frac{1+b}{b-1} \rightarrow \frac{1+b}{b-1} = \frac{1+b}{b-1} \rightarrow \frac{1+b}{b-1} = \frac{1+b}{b-1}$$

$$f\left(\frac{1}{n}\right) = \frac{1}{n+1} \rightarrow \frac{1}{n+1} = \frac{1}{n+1} \rightarrow \frac{1}{n+1} = \frac{1}{n+1}$$

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$$g(n) \rightarrow f(n) = 1 \rightarrow f(n) = 1$$

$$\rightarrow f(n) = 1 \rightarrow f(n) = 1$$

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