

گروه بازمی نفعی

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$$f(x) = \begin{cases} \cot \frac{\pi}{x} & x \leq 1 \\ \sqrt{x^2 + 1} & x > 1 \end{cases}$$

$$f\left(\frac{x}{y}\right) \rightarrow \cot \frac{\pi}{\frac{x}{y}} \rightarrow \frac{\pi}{\frac{y}{x}} \rightarrow \sqrt{3} \quad (1)$$

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

$$f \circ g\left(\frac{1}{x}\right) \rightarrow g\left(\frac{1}{x}\right) \rightarrow \frac{1}{\cos^2\left(\frac{\pi}{\frac{1}{x}}\right)} = \frac{1}{\left(\frac{1}{x}\right)^2} \quad f\left(\frac{1}{x}\right) = \frac{1}{x} \rightarrow (3)$$

$$f \circ g\left(\frac{1}{x}\right) = \sqrt{\frac{x^2 - 1}{x^2}} \xrightarrow{x \rightarrow 2} f\left(\frac{1}{2}\right) = \sqrt{\frac{4 - 1}{4}}$$

$$f \circ g(\sqrt{x}) \rightarrow g(\sqrt{x}) = \frac{\sqrt{x}}{1 - \sqrt{x}} \rightarrow \frac{\sqrt{x}}{1 - \sqrt{x}} \cdot \frac{1 + \sqrt{x}}{1 + \sqrt{x}} \rightarrow \frac{\sqrt{x} + x}{1 - x} = -\sqrt{x} - 2$$

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

$$f(x) = \sin x \quad g(x) = x \sqrt{1 - x^2} \quad g\left(\frac{1}{x}\right)$$

$$f\left(\frac{1}{x}\right) = \sin \frac{1}{x} = \frac{\sqrt{x}}{x} \quad g\left(\frac{\sqrt{x}}{x}\right) = \frac{\sqrt{x}}{x} \sqrt{1 - \left(\frac{\sqrt{x}}{x}\right)^2} \rightarrow \left[\frac{1}{x} \right]$$

$$1) f \circ g(x) \rightarrow \{(1, 0), (2, 0), (4, 1), (1, 1)\} \quad 2) g \circ f(x) = \emptyset \quad (5)$$

$$3) f \circ f(x) = \emptyset \quad 4) g \circ g(x) \rightarrow \{(1, 1), (2, 1), (4, 1)\}$$

$$f = \{(1, 1), (2, 1), (4, 1), (1, 1)\} \quad g = \{(1, 1), (2, 1), (4, 1), (1, 1)\} \quad (6)$$

$$f, g \in f \circ g \quad (f, 1) \in f \circ g$$

$$f(g(x)) = x$$

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

$$g\left(\frac{1}{x}\right) = 1$$

$$g(x) = b = 2$$

$$(a, b) \rightarrow (1, 2)$$

$$f(f(a)) = \varepsilon a + \varepsilon^2$$

$$g(x+y) = \varepsilon x + \varepsilon y$$

$$g \circ f(-1) = \varepsilon$$

(5)

$$f \circ f = \varepsilon a + \varepsilon^2$$

$$\hookrightarrow g(a) = \frac{\varepsilon}{\varepsilon} x \rightarrow -\frac{1}{\varepsilon}$$

(9)

$$\hookrightarrow a(a+b) + b \rightarrow a^2 + (a+b) = \varepsilon a + \varepsilon^2 \rightarrow a = \varepsilon \quad b = 1 \rightarrow \varepsilon a + 1$$

$$a = -\varepsilon \quad b = -\varepsilon \rightarrow \varepsilon a + \varepsilon^2$$

$$g \circ f(-1) = \frac{\varepsilon}{\varepsilon} (\varepsilon a + 1) - \frac{1}{\varepsilon} \rightarrow -1$$

$$\frac{\varepsilon}{\varepsilon} (-\varepsilon a - \varepsilon) - \frac{1}{\varepsilon} \rightarrow -1$$

$$f(-1) = 1$$

(V)

$$f(m) = \sqrt{m+1}a$$

$$g(a) = \frac{1}{a^2 - \varepsilon m}$$

$$D g \neq$$

(9)

$$\frac{1}{(\sqrt{m+1}a)(\sqrt{m+1}a - \varepsilon)} = \frac{1}{\sqrt{m+1}a - \varepsilon} \rightarrow D = (0, +\infty) = [1]$$

$$\sqrt{1-a^2} \leq 1 \rightarrow a^2 \leq 1$$

$$D_f = \{a \in \mathbb{R} \mid a \in [-1, 1]\}$$

$$D(g) = \mathbb{R} \rightarrow [-1, 1]$$

(1)

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

$$g(a) = \sqrt{a}$$

$$(f+g) \circ f = ?$$

(10)

$$\sqrt{a} + \sqrt{1-a^2} \rightarrow \sqrt{a^2} + \sqrt{\sqrt{1-a^2}}$$

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

$$\rightarrow [-1, 1]$$

$$\text{a)} f\left(\frac{\varepsilon m + 1}{a - \varepsilon}\right) = \varepsilon a + \varepsilon$$

$$\frac{\varepsilon m + 1}{a - \varepsilon} = t \rightarrow a = \frac{t - 1}{t - \varepsilon} = \frac{\varepsilon t + 1}{t - \varepsilon}$$

(9)

$$f(a) = f\left(\frac{\varepsilon m + 1}{a - \varepsilon}\right) + \varepsilon$$

$$\frac{1a + \varepsilon}{a - \varepsilon} + \varepsilon = \frac{1a + \varepsilon + \varepsilon a - \varepsilon^2}{a - \varepsilon}$$

$$\frac{1\varepsilon a - 11}{a - \varepsilon}$$

(5)

$$\text{b)} f\left(\frac{a + \frac{1}{a}}{t}\right) = a^2 + \frac{1}{a^2} \rightarrow a^2 + \frac{1}{a^2} + \varepsilon\left(\frac{a + \frac{1}{a}}{t}\right) = t^2$$

$$\hookrightarrow a^2 + \frac{1}{a^2} + t^2 - \varepsilon t$$

$$f(a) = a^2 - \varepsilon a$$

$$g(1) = 0 \quad g(f(a)) = 0 \rightarrow f(a) = a\sqrt{a} = 1 \rightarrow a = 1$$

(5)

$$g(\sqrt{1}) = 0 \quad g(f(a)) = f(a) = a\sqrt{a} = \sqrt{1} \rightarrow a = 1$$

(1)