

$$f\left(\frac{\sqrt{r}}{r}\right) = \cot \frac{\sqrt{r}}{r} = \cot \frac{\pi}{p} = \cot \epsilon_0 = \sqrt{r}$$

$$f(\sqrt{x}) = \sqrt{\sqrt{x} + 1} = \sqrt{e} = e \Rightarrow f \circ f\left(\frac{x}{e}\right) = e$$

$$g(\sqrt{x}) = \frac{\sqrt{x}}{1-\sqrt{x}} = \frac{\sqrt{x}(\sqrt{x}+1)}{-1} = -x-\sqrt{x} \quad (c)$$

$$\Rightarrow \sqrt{\epsilon} \approx 1/\epsilon \Rightarrow -(1+\sqrt{\epsilon})s = -1/\epsilon$$

$$f(-(1+\sqrt{2})) = \underbrace{[-(1+\sqrt{2})]}_{\approx -2.41} = -\underline{\underline{2.41}}$$

الف) $g\left(\frac{\pi}{4}\right) = 2 \cos^2 \frac{\pi}{4} = 2\left(\frac{1}{2}\right)^2 = \frac{1}{2}$

$$x=1 \rightarrow f\left(\frac{1}{x}\right) = \sqrt{\frac{x-1}{x}} = \frac{\sqrt{x}}{x}$$

$$\Rightarrow f_{\log}(\frac{\pi}{4}) = \frac{\sqrt{5}}{5}$$

$$f\left(\frac{\pi}{\epsilon}\right) = \sin \frac{\pi}{\epsilon} = \frac{\sqrt{y}}{y}$$

$$g\left(\frac{\sqrt{x}}{x}\right) = \frac{\sqrt{x}}{x} \sqrt{1 - \frac{1}{x}} = \frac{\sqrt{x}}{x} \times \frac{\sqrt{x}}{x} = \underline{\underline{\frac{1}{x}}}$$

$$g \circ f\left(\frac{\pi}{6}\right) = \frac{1}{4}$$

$$f(x) \notin D_g \quad \{\emptyset\} \quad (\neg)$$

$$\{(4, 5), (2, 5), (4, 12), (8, 12)\}$$

$$\{(1,1), (2,4), (4,1)\}$$

(2) $R_f \cap D_f = \emptyset$ $\{\emptyset\}$ (c)

$$\left. \begin{aligned} f(g(x)) &\Rightarrow f(g(t)) = t \Rightarrow g(t) = x \Rightarrow a = t \\ g(f(x)) &\Rightarrow g(f(t)) = 1 \Rightarrow f(a) = 1 \Rightarrow b = a \end{aligned} \right\} \Rightarrow \underline{(a, b) = (t, a)}$$

$$g(f(x)) \Rightarrow g(f(\varepsilon)) = 1 \Rightarrow f(\omega) = 1 \Rightarrow b = \omega \quad \} \Rightarrow \underline{(a, b) = (\varepsilon, \omega)}$$

$$\gamma(a, b) = (\xi, \omega)$$

$$f(x) = ax + b \quad f(-1) = b - a$$

$$f \circ f(x) = a^2x + ab + b = \varepsilon x + \gamma$$

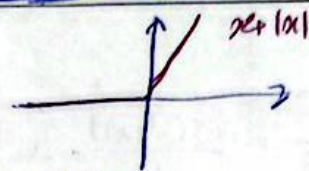
$$a^2 = \varepsilon \Rightarrow a = \begin{cases} +2 \Rightarrow b = 1 \\ -2 \Rightarrow b = -1 \end{cases} \Rightarrow \begin{cases} a^2 = \varepsilon \\ b - a = -1 \end{cases} \Rightarrow f(-1) = -1$$

$$g(-1) \xrightarrow{x^2+1} x = -1 \rightarrow f(-1) = -1 \Rightarrow g \circ f(-1) = -1$$

$$D_{g \circ f} \rightarrow x \in D_f \Rightarrow D_f = \mathbb{R} \Rightarrow x \in \mathbb{R} \text{ (I)}$$

$$f(x) \in D_g \Rightarrow \sqrt{x+|x|} \neq 0 \Rightarrow x \in \mathbb{R}^+ \text{ (II)}$$

$$\mathbb{R} - \{0\} \quad \sqrt{x+|x|} \neq \varepsilon \Rightarrow x \neq 1 \Rightarrow x \neq 1 \text{ (III)}$$



$$(I) \cap (II) \cap (III) = [0, +\infty) - \{1\}$$

$$\left. \begin{aligned} f(x) &= \sqrt{1-x^2} \rightarrow 1 \geq x \geq -1 \\ g(x) &= \sqrt{x} \rightarrow x \geq 0 \end{aligned} \right\} \Rightarrow x \geq 0 = D_{f+g}$$

$$(A) \cap (B) = [0, 1]$$

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

$$D_{(f+g)} = \mathbb{R} \Rightarrow x \in D_f \Rightarrow x \in [-1, 1] \text{ (A)}$$

$$f(x) \in D_{f+g} \Rightarrow \sqrt{1-x^2} \in [0, 1] \Rightarrow 0 \leq 1-x^2 \leq 1 \Rightarrow 0 \leq x^2 \leq 1 \Rightarrow 0 \leq x \leq 1 \text{ (B)}$$

$$x^2 + \frac{1}{x^2} = (x + \frac{1}{x})(x + \frac{1}{x} + 1) = A(A' + 1)$$

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

$$x + \frac{1}{x} = A' \quad A' = x^2 + \frac{1}{x^2} + 2$$

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

$$\Rightarrow \underline{\underline{f(x) = x^2 - x}}$$

$$f_1(A) = \frac{1^2 A - 1}{A-2} \Rightarrow f(x) = \frac{1^2 x - 1}{x-2}$$

$$g(f(x)) \leq 0 \Rightarrow f(x) \begin{cases} \rightarrow 1 \Rightarrow x\sqrt{x} \leq 1 \rightarrow x \leq 1 \\ \rightarrow \sqrt{2} \Rightarrow \sqrt{2}\sqrt{x} \leq x\sqrt{x} \rightarrow x \leq 2 \end{cases} \rightarrow \frac{2-1}{2} = \frac{1}{2}$$

اختلاف (تفاوت) $g \circ f(x)$