

$$(1) \quad \text{الف)} \quad \sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \rightarrow \sqrt{\frac{(x+1)(x-1) - x^2}{x(x-1)}} \\ \sqrt{\frac{-2x+1}{x(x-1)}} \rightarrow \frac{1}{x} \quad \begin{matrix} 0 & 1 & 1 \\ + & 1 & -1 & + & 1 & - \end{matrix} \quad D_f = (-\infty, 0) \cup \left[\frac{1}{x}, +\infty \right)$$

$$\Rightarrow) \quad \frac{\frac{1}{x+1} - \frac{1}{x}}{\frac{x}{x-1} + \frac{1}{x+2}} \quad x \neq 0, -1, 0, 1, 2 \\ \frac{x}{x-1} + \frac{1}{x+2} \neq 0 \rightarrow x(x+2) + (x-1) \neq 0 \\ x^2 + 3x - 1 \neq 0 \quad \begin{matrix} \varepsilon x + \omega \neq 0 \\ x \neq -\frac{\omega}{\varepsilon} \end{matrix} \\ D_f = \mathbb{R} - \left\{ -\frac{\omega}{\varepsilon}, -1, 0, 1, 2 \right\}$$

$$(2) \quad \text{الف)} \quad f(x) = \sqrt{\left[\left(\frac{1}{x}\right)^x - 9\right](32 - e^x)} \geq 0$$

$$\left(\frac{1}{x}\right)^x - 9 = 0 \rightarrow x = -2$$

$$32 - e^x = 0 \rightarrow e^x = 32 \rightarrow x = \frac{\omega}{\varepsilon}$$

$$\begin{matrix} -2 & \frac{\omega}{\varepsilon} \\ + & 1 & - & 1 & + \end{matrix}$$

$$D_f = (-\infty, -2] \cup \left[\frac{\omega}{\varepsilon}, +\infty \right)$$

$$(3) \quad \sqrt{x-1} + \sqrt{y+1} = 3$$

$$D_f = [1, +\infty)$$

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

$$\begin{cases} D(x^2 - x - 2) > 0 \rightarrow (x+1)(x-2) \\ \frac{-1}{+1-1-2} \rightarrow \frac{-1}{-2} = \frac{1}{2} \end{cases} \quad (1)$$

$$D_f = (-\infty, -1) \cup (2, +\infty) \cup \left(\frac{1}{2}, 1\right)$$

$$\sqrt{x^2 - 1} = 1 \rightarrow x^2 - 1 = 1 \rightarrow x^2 = 2$$

$$x = \pm\sqrt{2}$$

$$f(x) = \sqrt{2 + ax - x^2} \rightarrow D_f = [-a, b] \quad (2)$$

$$x = -2 \rightarrow 2 - 2a - 4 = 0 \rightarrow 2a = -2 \rightarrow a = -1$$

$$\begin{aligned} \rightarrow f(x) &= \sqrt{-(x^2 + \frac{1}{2}x - 2)} \rightarrow -(x^2 + \frac{1}{2}x - 2) = 0 \\ &= -(x - \frac{1}{2})(x + 4) \rightarrow \begin{matrix} x = \frac{1}{2} \\ x = -4 \end{matrix} \end{aligned}$$

$$a + b = \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$$

$$f(x) = \begin{cases} \sqrt{2x - 2} & x > 1 \\ \sqrt{2x + 2} & x < 1 \end{cases} \quad g(x) = \sqrt{f(x) - x} \geq 0 \quad (3)$$

$$f(x) > 1 \rightarrow \sqrt{2x - 2} - x \geq 0 \rightarrow \sqrt{2x - 2} \geq x \rightarrow x - 1 \geq 0 \rightarrow x \geq 1$$

$$f(x) < 1 \rightarrow \sqrt{2x + 2} - x \geq 0 \rightarrow \sqrt{2x + 2} \geq x \rightarrow x > -2 \rightarrow -1 \leq x < 1$$

$$D_f = [-1, +\infty)$$

$$f(x) = x^2 - f(x) \quad f\left(\sin \frac{\pi}{\sqrt{x}} + \cos \frac{\pi}{\sqrt{x}}\right) = ? \quad (9)$$

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

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

$$\rightarrow -\frac{1}{x}$$

$$f(f(a)) = a \quad f(x) = \frac{x+1}{x-1} \quad (10)$$

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

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

$$\text{نوعی: } \frac{2a}{a-1} = f(f(a)) = \frac{2a}{a-1} = a \rightarrow a \in \mathbb{R} - \{1\}$$

$$f(x) = x^2 - f(x) \quad g(x) = \sqrt{x^2 - 1} \quad (11)$$

$$f(g(a)) = -x$$

$$\frac{x=g(a)}{x} \rightarrow g(a)^2 - f(g(a)) = -x \rightarrow (g(a)-x)^2 = 0$$

$$g(a) = x$$

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

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$$f(n+r) = n^r - \omega n + \gamma$$

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$$f(r) \times f(-r) = ? \rightarrow r \times -vr = -vr^2$$

$$n=1 \rightarrow f(r) = r \quad n=-1 \rightarrow f(-r) = -vr$$

$$f(r \cos^2 n + \omega \cos n) = \tan^2 n$$

(1.)

$$f(r, \omega) = ?$$

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$$r, \omega = \frac{v}{r}$$

$$(r \cos^2 n + \omega \cos n = \frac{v}{r}) \times r \rightarrow r \cos^2 n + 1 \cdot \cos n - v = 0$$

$$(r \cos n - v)(r \cos n + 1) = 0$$

$$\cos n = \frac{v}{r} \quad \vee \quad \cos n = -\frac{1}{r}$$

$$\tan^2 n = \frac{1}{\cos^2 n} - 1 \rightarrow \tan(r, \omega) = r$$

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