

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

$$\rightarrow \frac{2a}{2} = (a) \checkmark \rightarrow \boxed{a \in \mathbb{R} - \{1\}} \quad \text{P}$$

$$g(a) = \sqrt{a^2 + 1}$$

$$f(g(a)) = f(\sqrt{a^2 + 1}) \rightarrow (\sqrt{a^2 + 1})^2 - \varepsilon(\sqrt{a^2 + 1})$$

$$(\sqrt{a^2 + 1})^2 = a^2 + 1 \rightarrow \boxed{f(g(a)) = a^2 + 1 - \varepsilon\sqrt{a^2 + 1}}$$

$$x + y = \varepsilon \rightarrow \underline{x = 1}$$

$$f(\varepsilon) = (1)^2 = 2(1) + 9 \rightarrow \boxed{f(\varepsilon) = 11}$$

$$x + y = -y \rightarrow \underline{x = -y} \rightarrow f(-y) = (-y)^2 = 2(-y) + 9 \rightarrow \boxed{f(-y) = y^2 - 2y + 9}$$

$$f(\varepsilon)(f(-y)) = 11 \times y^2 = 11y^2 \quad \text{P}$$

$$\boxed{\cos x = t}$$

$$t^2 + \sin^2 x = 1 \rightarrow t^2 + \sin^2 x - 1 = 0$$

$$1t^2 + 1\sin^2 x - 1 = 0 \rightarrow x = \frac{-1 \pm \sqrt{1}}{1} \quad \begin{cases} t_1 = 1 \checkmark \\ t_2 = -1 \checkmark \end{cases} \quad \text{P}$$

الف) $x \neq 0$ و $x-1 \neq 0 \rightarrow x \neq 1$ $\left\{ \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \right\} \xrightarrow{\text{مخرج مشترک}} \frac{(x-1)^2 - x^2}{x(x-1)} \geq 0 \rightarrow \frac{-2x+1}{x(x-1)} \geq 0$ ۱، ۵

$D_f = \{0, \frac{1}{2}\} \cup (1, +\infty)$ جدول تست علامت
باید نشود

$\rightarrow x \neq -1$ و $x \neq 0$ و $x \neq 1$ و $x \neq -2$ $\left\{ \frac{x}{x-1} + \frac{1}{x+2} \neq 0 \right\} \rightarrow D_f = \mathbb{R} - \left\{ -2, -\frac{1}{2}, 0, 1 \right\}$

الف) $\left(\frac{1}{x} - 4 \right) (3x - 2) \geq 0$ تقریب علامت $D_f = (-\infty, -2] \cup [2, +\infty)$

$\rightarrow x = -2$ $x = \frac{2}{3}$

باید دامنه را نفس کنی این برداشت! ۱، ۵

$\rightarrow x-1 > 0 \rightarrow x > 1$ و $y+1 > 0 \rightarrow y > -1$ $\rightarrow D_f = \{ (x, y) \in \mathbb{R}^2 \mid x > 1 \text{ و } y > -1 \}$

$(x^2 - x - 2) < 0 \rightarrow x = -1 \text{ و } 2 \rightarrow (-\infty, -1) \cup (2, +\infty)$

$x^2 - 1 > 0 \rightarrow x > 1 \rightarrow (-\infty, -1) \cup (1, +\infty)$

$\xrightarrow{\text{اشتراک}} D_f = (-\infty, -1) \cup (2, +\infty)$ ۲

$3 + ax - x^2 \geq 0 \rightarrow -x^2 + ax + 3 \geq 0 \rightarrow x_1 = -2$

$x = 2 \rightarrow -2 - 2a + 3 = 0 \rightarrow -1 - 2a = 0 \rightarrow a = -\frac{1}{2}$

$-x^2 - \frac{1}{2}x + 3 = 0 \xrightarrow{\times 2} 2x^2 + x - 6 = 0 \rightarrow b = 1, 5$

$\left\{ \begin{array}{l} a + b = 1, 5 \\ a = -\frac{1}{2} \\ b = 1, 5 \end{array} \right.$ ۴

$f(x) - x \geq 0 \rightarrow f(x) \geq x$

① $x > 1 \rightarrow 3x - 2 \geq x \rightarrow x \geq 1$ اشتراک

② $x < 1 \rightarrow 2x + 3 \geq x \rightarrow x \geq -3$

$D_g = [-3, +\infty)$ ۵

$\sin \frac{\mu}{\sqrt{3}} = \frac{\sqrt{3}}{2}$, $\cos 2\mu = 1$

$\frac{\sqrt{3}}{2} + 1 \rightarrow \frac{\sqrt{3} + 2}{2}$ $\neq (\frac{\sqrt{3} + 2}{2})$? ۱، ۵

(الف-1) $\frac{x-1}{x} - \frac{x}{x-1} \geq 0 \rightarrow \frac{n^2 - 2n + 1 - n^2}{x(x-1)} \geq 0 \rightarrow \frac{-2n+1}{x(x-1)} \geq 0$

$\frac{1}{x} - \frac{1}{x-1} \geq 0 \rightarrow Df = (-\infty, 0) \cup [\frac{1}{2}, 1)$

(ب-2) $\sqrt{x-1} + \sqrt{y+1} = 2$, $\sqrt{y+1} = 2 - \sqrt{x-1} \rightarrow 2 - \sqrt{x-1} \geq 0 \rightarrow \sqrt{x-1} \leq 2 \rightarrow x \leq 8$ I

$x-1 \geq 0 \rightarrow x \geq 1$ I

I, II $\rightarrow 1 \leq x \leq 8 \rightarrow Df = [1, 8]$

$f(n) = n^2 - 2n = n^2 - 2n + 2 - 2 = (n^2 - 2n + 1) - 2 = (n-1)^2 - 2$ -4

$\sin \frac{\pi}{\epsilon} + \cos 2\pi = \sqrt{\frac{\pi}{\epsilon}} + 1 \rightarrow f(\sqrt{\frac{\pi}{\epsilon}} + 1) = (\sqrt{\frac{\pi}{\epsilon}} + 1 - 1)^2 - 2 = (\frac{\pi}{\epsilon}) - 2 = -\frac{1}{\epsilon}$

- 8

$f(\star) = -2 \rightarrow \star^2 - 2\star = -2 \rightarrow (\star - 2)^2 = 0 \rightarrow \star = 2 \checkmark$

$g(a) = 2 \rightarrow \sqrt{a^2 - 1} = 2 \rightarrow a^2 - 1 = 4 \rightarrow a^2 = 5 \rightarrow a = \pm \sqrt{5}$