

الف) $\frac{(n-1)^2 - n^2}{n(n-1)} \geq 0 \rightarrow \frac{n^2 - 2n + 1 - n^2}{n(n-1)} \geq 0 \rightarrow \frac{1-2n}{n(n-1)} \geq 0$ ①
 $+ \frac{0}{+} - \frac{1}{+} + \frac{1}{+} -$ $D = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $n \neq -1, n \neq 0, n \neq 1, n \neq -2, \frac{3}{n-1} + \frac{1}{n+2} \neq 0$

$\rightarrow \frac{3(n+2) + n-1}{(n-1)(n+2)} \neq 0 \rightarrow \frac{4n+5}{(n-1)(n+2)} \neq 0 \rightarrow n \neq -\frac{5}{4}$

$\rightarrow D = \mathbb{R} - \{-1, 0, 1, -2, -\frac{5}{4}\}$

الف) $((\frac{1}{3})^n - 9)(32 - 5^n) \geq 0 \rightarrow (3^{-n} - 3^2)(2^5 - 5^n) \geq 0$ ②

$\rightarrow \frac{-2}{+} \frac{5}{+} \rightarrow D = (-\infty, -2] \cup [2, 5, +\infty)$

ب) $n-1 \geq 0 \rightarrow n \geq 1$ $\sqrt{n-1} - 3 = -\sqrt{y+1}$

$\rightarrow \sqrt{n-1} - 3 \leq 0 \rightarrow \sqrt{n-1} \leq 3 \rightarrow n-1 \leq 9 \rightarrow n \leq 10$ $\rightarrow D = [1, 10]$

$n^2 - n - 2 \geq 0 \rightarrow (n-2)(n+1) \geq 0 \rightarrow \frac{-1}{+} \frac{2}{+} \rightarrow (-\infty, -1) \cup (2, +\infty)$ ③

$n^2 - 1 \geq 0 \rightarrow n \geq 1 \rightarrow n \geq 1$ $\rightarrow D = (-\infty, -1) \cup (2, +\infty)$

$n = -2 \rightarrow 3 - 2a - 5 = 0 \rightarrow a = -\frac{1}{2}$ ④

$\rightarrow -n^2 - \frac{1}{2}n + 3 \geq 0 \rightarrow -(n+2)(n-\frac{3}{2}) \geq 0 \rightarrow \frac{-2}{-} \frac{3}{+}$

$D = [-2, \frac{3}{2}] \rightarrow b = \frac{3}{2}$ $a+b = -\frac{1}{2} + \frac{3}{2} = 1$

$$f(u) = u, 0 \rightarrow f(u), u$$

(3)

$$u > 1 \rightarrow \sqrt{u} - \sqrt{u}, u \rightarrow u, 1 \quad \text{disproves } \checkmark$$

$$u < 1 \rightarrow \sqrt{u} + \sqrt{u}, u \rightarrow u, -\sqrt{u} \rightarrow -\sqrt{u}, u < 1$$

$$\rightarrow D_g = [-\sqrt{u}, +\infty)$$

$$\sin \frac{\pi}{\sqrt{u}} + C.S. \sqrt{u} = \frac{\sqrt{u} + \sqrt{u}}{\sqrt{u}} \rightarrow f\left(\frac{\sqrt{u} + \sqrt{u}}{\sqrt{u}}\right) = \sqrt{u}(\sqrt{u} + \sqrt{u}) - \frac{1}{\sqrt{u}}(\frac{\sqrt{u} + \sqrt{u}}{\sqrt{u}})$$

$$= \frac{1}{\sqrt{u}} + \sqrt{u}\sqrt{u} - \sqrt{u}\sqrt{u} - \frac{1}{\sqrt{u}} = \left(\frac{-1}{\sqrt{u}}\right)$$

(4)

$$f(f(a))' = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{2a}{a-1}}{\frac{2}{a-1}} = a \quad a = \{R, f, i\}$$

(5)

$$f(u) = -\frac{1}{u} \rightarrow u^2 - fu = -\frac{1}{u} \rightarrow u^2 - fu + \frac{1}{u} = 0 \rightarrow u = \sqrt{u}$$

$$(u - \sqrt{u})^2 = 0$$

(6)

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

$$f(u + \sqrt{u}) = (u - \sqrt{u})(u - \sqrt{u})$$

(7)

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

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

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

$$f(C.S. u) + \frac{1}{u} C.S. u = \frac{1}{u} = 0$$

(8)

$$C.S. u + \frac{1}{u} C.S. u - 1 = 0$$

$$(C.S. u + \frac{1}{u})(C.S. u - 1) = 0$$

$$(f(C.S. u + \frac{1}{u}))(C.S. u - \frac{1}{u}) = 0$$

$$\rightarrow C.S. u = \frac{1}{u} \times \frac{1}{u}, \cos u = \frac{1}{u} \checkmark$$

$$u = \pm \frac{\pi}{u} \rightarrow \tan u = \frac{1}{u}$$