

الف) $\frac{x-1}{x} - \frac{x}{x-1} > 0 \rightarrow \frac{x^2-1-x^2}{x(x-1)} > 0 \rightarrow \frac{-1}{x(x-1)} > 0 \rightarrow D_f = (-\infty, 0) \cup (\frac{1}{x}, 1)$

ب) $\frac{\frac{1}{x+1} - \frac{x}{x-1}}{\frac{x}{x-1} + \frac{1}{x+1}} = 0 \rightarrow \frac{x}{x-1} + \frac{1}{x+1} \neq 0 \rightarrow \frac{x(x+1) + (x-1)}{(x-1)(x+1)} \neq 0 \rightarrow \frac{x^2+x+x-1}{(x-1)(x+1)} \neq 0 \rightarrow \frac{x^2+2x-1}{(x-1)(x+1)} \neq 0$
 $D = \mathbb{R} - \{-1, 1, \frac{-2 \pm \sqrt{4+4}}{2}, 0\}$

الف) $x^2 > x^2 \rightarrow x > 1 \rightarrow x < -1$
 $x^2 > x^2 \rightarrow x^2 < x^2 \rightarrow x < \omega \rightarrow x \leq \frac{\omega}{x} \rightarrow (-\infty, -1] \cup [\frac{\omega}{x}, +\infty)$
 $x > -1 / x > \frac{\omega}{x} \rightarrow x > \frac{\omega}{x}$

ب) $\sqrt{x-1} + \sqrt{3+1} = 2$
 $\downarrow \quad \downarrow$
 $x-1 > 0 \quad 3+1 > 0$
 $\downarrow \quad \downarrow$
 $x > 1 \quad 3 > -1 \rightarrow D = x \in [1, +\infty), y \in [-1, +\infty)$

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

$\sqrt{x^2-1} + 1 \neq 0 \rightarrow \sqrt{x^2-1} \neq -1 \checkmark \rightarrow D_f = (-\infty, -1) \cup (1, +\infty)$
 $\downarrow$
 $x^2-1 > 0 \rightarrow x^2 > 1 \rightarrow x > 1 \vee x < -1$

$-x^2 + ax + 2 > 0$
 $\frac{c}{a} = -2 \rightarrow x b = -2 \rightarrow b = \frac{x}{x}$
 $\frac{-b}{a} = a \rightarrow -x + \frac{x}{x} \rightarrow a = \frac{1}{x}$
 $a + b \rightarrow \frac{x}{x} - \frac{1}{x} = 1$

$f(x) - x > 0 \rightarrow f(x) > x \quad \left. \begin{array}{l} x > 1 \rightarrow x^2 - x - 1 > 0 \rightarrow x > 1 \\ x < 1 \rightarrow x^2 + x - 1 > 0 \rightarrow x > -2 \end{array} \right\} D = [-2, +\infty)$

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

$f(x) = \frac{x+1}{x-1}$
 $f(a) = \frac{a+1}{a-1} \quad f(f(a)) = \frac{f(a)+1}{f(a)-1} \rightarrow \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} \rightarrow \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} \rightarrow \frac{2a}{2} = a \rightarrow \mathbb{R} - \{1\} \rightarrow 1$

$f(g(a)) = -\epsilon$

$f \rightarrow x^2 - \epsilon x + \epsilon = 0 \rightarrow (x-1)^2 = 0 \rightarrow x = 1 \rightarrow g(a) = 1 - \sqrt{a^2-1} \rightarrow a^2-1 = \epsilon \rightarrow a = \pm \sqrt{1+\epsilon}$

$$x = -y \rightarrow f(-y) = y^2 + y^2 + y \rightarrow y^2$$

$$y^2 \times y = y^3$$

$$x = 1 \rightarrow f(1) = 1 - \omega + y \rightarrow y$$

$$t \cos t + \omega \cos = \frac{y}{r} \quad \cos = t \quad t \cos t + \omega t - \frac{y}{r} = 0 \rightarrow \lambda t^2 + \omega t - y = 0 \quad t = \frac{-\omega \pm \sqrt{\omega^2 + 4y}}{2\lambda} \rightarrow \frac{1}{r} \pm \frac{y}{\omega} \quad \frac{y}{\omega}$$

$$\cos = \frac{1}{r} \rightarrow \tan r = \frac{1 - \frac{1}{r}}{\frac{1}{r}} \rightarrow r$$