

الف) $f(x) = \sqrt{\frac{x-1}{x} - \frac{x}{x-1}}$
 $x \neq 0 \quad x \neq 1 \quad \vee \quad \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \rightarrow \frac{(x-1)^2 - x^2}{x(x-1)} \geq 0$
 $\frac{1-x^2}{x(x-1)} \geq 0$
 $D = (-\infty, 0) \cup [\frac{1}{4}, 1)$

ب) $\rightarrow x \neq 0 \quad x \neq -2 \quad x \neq -1 \quad x \neq 1$
 $\frac{x}{x-1} + \frac{1}{x+2} \neq 0 \quad \frac{x}{x-1} \neq \frac{-1}{x+2} \rightarrow x^2 + 4 = 1 - x$
 $x = -\frac{5}{2}$
 $D = \mathbb{R} - \{-2, -\frac{5}{2}, -1, 1\}$

الف) $((\frac{1}{x})^2 - 9)(x^2 - 4) \geq 0$
 $\rightarrow (\frac{1}{x})^2 = 9 \quad \rightarrow x^2 = \frac{1}{9}$
 $x = -\frac{1}{3} \quad x = \frac{1}{3}$
 $x^2 - 4 = 0 \rightarrow x = -2 \quad x = 2$
 $D = (-\infty, -2] \cup [\frac{2}{3}, \infty)$

ب) $\sqrt{y+1} = 3 - \sqrt{x-1}$
 $3 - \sqrt{x-1} \geq 0 \rightarrow \sqrt{x-1} \leq 3 \rightarrow x-1 \leq 9 \rightarrow x \leq 10$
 $D = [1, 10]$

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

$-2, b \rightarrow \sim (x^2 - ax - 3)$
 $b + (-2) = a \rightarrow \frac{3}{4} - 2 = -\frac{1}{4} \quad a + b = 1$
 $b \times (-2) = -3 \rightarrow b = \frac{3}{2}$

$x \geq 1 \rightarrow 2x + 2 - x \geq 0 \quad x \geq 1 \quad \checkmark$
 $x < 1 \rightarrow 2x + 2 - x \geq 0 \quad x \geq -3 \rightarrow -3 \leq x < 1$
 $D = [-3, 1) \cup [1, \infty) = [-3, \infty)$

$$f\left(\frac{\sqrt{r}}{r}+1\right) \rightarrow f\left(\frac{1+\sqrt{r}}{r}\right)$$

$$r\left(\frac{1+\sqrt{r}}{r}\right)^r - r - r\sqrt{r} = r \times \frac{r+r+\varepsilon\sqrt{r}}{\varepsilon} - r - r\sqrt{r}$$

$$\frac{r+r+\cancel{\varepsilon\sqrt{r}}}{r} - \frac{1-\cancel{\varepsilon\sqrt{r}}}{r} \rightarrow \frac{r-1}{r} \rightarrow \underline{-\frac{1}{r}}$$

$$f\left(\frac{a+1}{a-1}\right) = a \quad \textcircled{1} \quad a \neq 1 \quad \left\{ \begin{array}{l} \frac{a+1}{a-1} + 1 \\ \frac{a+1}{a-1} - 1 \end{array} \right. \rightarrow \frac{a+1+a-1}{a-1} \rightarrow \frac{2a}{a-1} \rightarrow \frac{ra}{r} \rightarrow a \quad \textcircled{2} \quad R \checkmark$$

$$D = \# \mathbb{N}^r \rightarrow R - \{1\}$$

$$x^r - \varepsilon x = -\varepsilon \rightarrow x^r - \varepsilon x + \varepsilon = 0 \quad (x-r)^r = 0$$

$$\sqrt{x^r - 1} = r \rightarrow x^r - 1 = \varepsilon \quad x^r = a \quad \textcircled{3} \quad a = \pm \sqrt[r]{a}$$

$$x = -4 \rightarrow 34 + 30 + 4 = 68 = f(-3)$$

$$x = 1 \rightarrow 1 - 5 + 4 = 0 = f(1)$$

$$f(1) \times f(-3) = 0 \times 68 = \underline{0}$$

$$r \cos^2 \alpha + a \cos \alpha - \frac{1}{r} = 0 \quad \cos \alpha = t \rightarrow r t^2 + a t - \frac{1}{r} = 0$$

$$\sqrt{\Delta} = \sqrt{r^2 a^2 + 4} = \sqrt{11} = 3$$

$$t = \frac{-b \pm \sqrt{\Delta}}{2a} \rightarrow \frac{-a \pm 3}{2r} \rightarrow \frac{-1 \pm 3}{2} \cdot \frac{1}{r} \rightarrow \cos \alpha = \frac{1}{r}$$

$$\alpha = \cos^{-1} \frac{1}{r} = \frac{\pi}{4}$$

$$(\tan \frac{\pi}{4})^r = (\sqrt{r})^r = \underline{r}$$