

$$\text{الف) } f(x) = \sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \rightarrow \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \quad (1)$$

$$\rightarrow \frac{x^2+1-2x-x^2}{x^2-x} = \frac{1-2x}{x(x-1)} \geq 0 \quad \begin{matrix} 0 & 1 & 1 \\ + & - & + & - \end{matrix}$$

$$D_x = (-\infty, 0) \cup \left[\frac{1}{2}, 1\right)$$

$$\text{ب) } f(x) = \frac{\frac{1}{x+1} - \frac{1}{x}}{\frac{1}{x-1} + \frac{1}{x+1}} \rightarrow \frac{\frac{x}{x+1} - \frac{x+1}{x}}{\frac{x}{x-1} + \frac{x}{x+1}} = \frac{x^2+x-x-1}{x^2-x-2}$$

$$= \frac{x+1}{x^2-x-2} \neq 0$$

$$D_x = \mathbb{R} - \left\{ -2, -\frac{1}{2}, 1 \right\}$$

$$x \neq -\frac{1}{2}$$

$$x \neq 1, -2$$

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$$\text{الف) } f(x) = \sqrt{\left(\left(\frac{1}{x}\right)^x - 9\right)(12 - x^2)} \Rightarrow \left(\frac{1}{x^x} - 3^2\right)(12 - x^2) \geq 0 \quad (2)$$

$$\frac{-2 \quad 12}{+ \quad - \quad +} \rightarrow D_x = (-\infty, -2] \cup [12, +\infty)$$

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

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

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$$f(x) = \frac{\log_f(x^r - x - r)}{\sqrt{x^r - 1} + 1} \quad \rightarrow \quad x^r - x - r > 0 \rightarrow (x-r)(x+r) > 0 \quad (2)$$

$$\frac{-1}{r+1} - \frac{r}{r-1}$$

$$\sqrt{x^r - 1} \neq -1 \rightarrow x \in \mathbb{R} \quad \cap \quad D_x = (-\infty, -1) \cup (1, +\infty)$$

$$f(x) = \sqrt{r^2 + ax - x^r} \quad \xrightarrow{x=-r} \quad r^2 - ra - r = 0 \rightarrow -ra = 1 \quad (3)$$

$$\xrightarrow{x=b} \quad r^2 - \frac{b}{r} - b^r = 0 \rightarrow rb^r + b - r = 0$$

$$\downarrow \text{ac} \quad b^r + b - 1r = 0 \rightarrow (b+r)(b-r) = 0$$

$$a+b = -0.8 + 1.8 = 1 \quad \downarrow \div r \quad b = -r, 1.8 \leftarrow (b+r)(b-1.8) = 0$$

$$g(x) = \sqrt{f^2(x) - x} \rightarrow f^2(x) - x \geq 0 \quad (4)$$

$$f^2(x) = x^r - r = x \rightarrow x^r - r - x = 1$$

$$\downarrow \quad \frac{-r}{r} - \frac{1}{r}$$

$$f(x) = x + r = x \rightarrow x = -r \quad D_x = (-\infty, -r] \cup [1, +\infty)$$

$$f^2(x) = rx^r - x \rightarrow f\left(\sin \frac{\pi}{r} + \cos r\pi\right) \quad (5)$$

$$= f\left(\frac{\sqrt{r}}{r} + 1\right) = \frac{9}{r} + r + r\sqrt{r} - r\sqrt{r} - r = 1.8 - 1 = 1.8$$

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$$f^2(f(a)) = a \rightarrow a = \frac{f^2(a)+1}{f^2(a)-1} = \frac{\frac{a+1}{a-1}+1}{\frac{a+1}{a-1}-1} \quad (V_0)$$

$$\Rightarrow a = \frac{1+a}{a-1} \times \frac{a-1}{1} = a \rightarrow D_a = \mathbb{R} - \{1\}$$

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

$$\rightarrow a^2-1 - f\sqrt{a^2-1} = -f \xrightarrow{\sqrt{a^2-1}=t} t^2 - ft + f = 0$$

$$\downarrow$$

$$t = 1$$

$$\downarrow$$

$$\sqrt{a^2-1} = 1$$

$$\downarrow$$

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

$$f^2(n+r) = (n-r)(n-r) \rightarrow f^2(1) = f^2(1+r) \quad (9)$$

$$= (1-r)(1-r)$$

$$f^2(-r) = f^2(-4+r) = (-4-r)(-4-r) = 4$$

$$= \sqrt{4}$$

$$f^2(1) \times f^2(-r) = 1 \times \sqrt{4} = 1 \times 2$$

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$$r \cos^2 u + \delta \cos u = r_1 \delta \xrightarrow{ac} (\cos u + v)(\cos u - r) \quad (1)$$

$$r(r_1 \delta) = \tan^2 \gamma = \sqrt{r_1^2} = r$$

$$\downarrow \div r$$
$$\cos u = -\frac{v}{r}, \frac{1}{r}$$
$$\times$$
$$\downarrow$$
$$u = \frac{\pi}{r}$$