

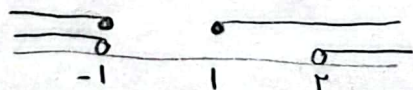
الف) $f(x) = \sqrt{\frac{x-1}{x}} - \frac{x}{x-1}$ $\xrightarrow{x \neq 0, x \neq 1} \frac{(x-1)^2 - x^2}{x(x-1)} \geq 0 \rightarrow \frac{-2x+1}{x(x-1)} \geq 0$ $\left| \begin{array}{ccc} 0 & \frac{1}{2} & 1 \\ + & - & + \end{array} \right|$
 $D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $f(x) = \frac{\frac{1}{x+1} - \frac{2}{x}}{\frac{3}{x-1} + \frac{1}{x+2}}$ $\xrightarrow{x \neq -1, x \neq 0, x \neq 1, x \neq -2} \frac{\frac{1}{x+1} - \frac{2}{x}}{\frac{3}{x-1} + \frac{1}{x+2}} \neq 0 \rightarrow \frac{3x+4+x-1}{(x-1)(x+2)} \neq 0 \rightarrow x+3 \neq 0$
 $D_f = \mathbb{R} - \{-2, -\frac{3}{2}, -1, 0, 1\}$

الف) $f(x) = \sqrt{(\frac{1}{x})^n - 9} (32 - 4^n)$ $((\frac{1}{x})^n - 9)(32 - 4^n) \geq 0$ $\left| \begin{array}{ccc} -2 & \frac{5}{2} & 4 \\ + & - & + \end{array} \right|$
 $D_f = (-\infty, -2] \cup [\frac{5}{2}, +\infty)$

ب) $\sqrt{x-1} + \sqrt{y+1} = 3 \rightarrow \sqrt{y+1} = 3 - \sqrt{x-1} \rightarrow 3 - \sqrt{x-1} \geq 0 \rightarrow 3 \geq \sqrt{x-1}$
 $x \geq 1 \quad \cap \rightarrow 1 \leq x \leq 17 \quad \cap \rightarrow x \leq 17 \quad \cap \rightarrow 1 \geq x-1$

$f(x) = \log_f \frac{(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1}$ $\rightarrow x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0$ $\left| \begin{array}{ccc} -1 & 2 & 2 \\ + & - & + \end{array} \right|$
 $\rightarrow (x-1)(x+1) \geq 0$ $\left| \begin{array}{ccc} -1 & 1 & 1 \\ + & - & + \end{array} \right| \cap \rightarrow D_f = (-\infty, -1) \cup (1, +\infty)$



$f(x) = \sqrt{2+ax-x^2} \rightarrow D_f = [-2, b]$ $a+b = -\frac{1}{4} + \frac{3}{4} = \frac{1}{2}$

$-x^2+ax+2 \geq 0 \rightarrow x^2-ax-2 \leq 0$
 ضرب در -1
 جمع در 2

$-2+b = a \rightarrow a = -\frac{1}{4}$
 $-2b = -3 \rightarrow b = \frac{3}{2}$

$f(x) = \begin{cases} 2x-2 & x \geq 1 \\ 2x+3 & x < 1 \end{cases}$

$g(x) = \sqrt{f(x)-x} \rightarrow f(x)-x \geq 0 \rightarrow f(x) \geq x$ $\left\{ \begin{array}{l} \rightarrow \frac{2x}{x-2} \geq x \xrightarrow{x \geq 1} x \geq 1 \\ \rightarrow \frac{2x}{x+3} \geq x \xrightarrow{x < 1} -3 \leq x < 1 \end{array} \right\} \cup$
 $D_f = [-3, +\infty)$

$$f(n) = \sqrt{n} - \epsilon n \rightarrow \sqrt{n(n-\epsilon)}$$

$$f\left(\frac{\sin \frac{\pi}{\sqrt{r}} + \cos \frac{\pi}{\sqrt{r}}}{\sqrt{\frac{r}{r}}}\right) \rightarrow r\left(\frac{\sqrt{r}}{r} + 1\right)\left(\frac{\sqrt{r}}{r} - 1\right) \rightarrow r\left(\frac{r}{r} - 1\right) = -\frac{1}{r}$$

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$$f(n) = \frac{n+1}{n-1}$$

$$f(a) = \frac{a+1}{a-1}$$

$$f(f(a)) = a$$

$$a = ?$$

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

$$a \rightarrow \mathbb{R} - \{1\}$$

$$a \neq 1$$

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$$f(n) = \sqrt{n} - \epsilon n$$

$$g(n) = \sqrt{n^2 - 1}$$

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

$$a = ?$$

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

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$$f(n+r) = \sqrt{n} - \epsilon n + r \rightarrow n+r = r \rightarrow n=0 \rightarrow 1-0+r = r$$

$$f(r) \times f(-r) = ? \rightarrow n+r = -r \rightarrow n = -2r \rightarrow r^2 + r + r = \sqrt{r^2}$$

$$r \times \sqrt{r} = 1 \times r$$

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$$f(r \cos x + \omega \cos x) = \tan x \rightarrow r \cos x + \omega \cos x - \frac{1}{r} = 0$$

$$f\left(\frac{r}{\sqrt{r}}\right) = ? \rightarrow \textcircled{r}$$

$$\frac{-\omega \pm \sqrt{\omega^2 + \omega^2}}{1} = \frac{-\frac{1}{r} \pm \frac{1}{r}}{1} = -\frac{1}{r} \rightarrow \textcircled{r}$$

$$\frac{1}{r} + \frac{\sin^2 x}{\frac{r}{r}} = 1$$

$$\tan^2 x \frac{\sin^2 x}{\cos^2 x} \rightarrow \frac{r}{\frac{1}{r}} = \textcircled{r}$$

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