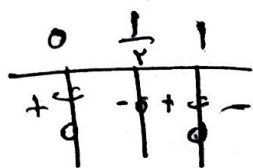


الف) $f(x) = \sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \geq 0$ $\frac{(x-1)^2 - x^2}{x(x-1)} \geq 0 \rightarrow \frac{1-2x}{x(x-1)} \geq 0$ -1



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

-) $f(n) = \frac{1}{n+1} - \frac{2}{n}$
 $\frac{2}{n-1} + \frac{1}{n+2} \neq 0$

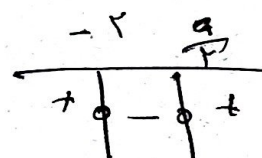
$n \neq -1, 0, 1, -2$

٢

$D_f = \mathbb{R} - \{-2, -\frac{1}{2}, -1, 0, 1\}$

$\frac{\varepsilon n + \delta}{(n-1)(n+2)} \neq 0$ $n \neq -\frac{\delta}{\varepsilon}$

الف) $f(n) = \sqrt{((\frac{1}{n})^n - 9)(32 - \varepsilon^n)} \geq 0$



$(\frac{1}{n})^n - 9 = 0$
 $n = -2$

$n = \frac{9}{\varepsilon}$
 $32 - \varepsilon^n = 0 \rightarrow \varepsilon^n = 32$

$D_f = (-\infty, -2] \cup [\frac{9}{\varepsilon}, +\infty)$

-) $\sqrt[n-1]{n-1} + \sqrt[n]{n+1} = 2$

$n-1 \geq 0$
 $n \geq 1$

$\sqrt[n-1]{n-1} = 2 - \sqrt[n]{n+1}$

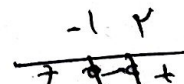
$D_f = [1, 12]$

$\sqrt[n-1]{n-1} \leq 2$

$n-1 \leq 11$ $n \leq 12$

$f(n) = \log_{\varepsilon} \frac{(n^2 - n - 2)}{\sqrt{n^2 - 1} + 1}$

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



$(-\infty, -1) \cup (2, +\infty)$

$n^2 - 1 \geq 0$
 $n^2 \geq 1$
 $n \geq 1$
 $n \leq -1$

$(-\infty, -1] \cup [1, +\infty)$

$\sqrt{n^2 - 1} \neq -1$

$D_f = (-\infty, -1) \cup (2, +\infty)$

$$f(n) = \sqrt{r + an - n^2}$$

$$= (n+r)(n-b)$$

$$\hookrightarrow -n^2 + (r+b)n + rb$$

$$\Rightarrow \begin{cases} b=r \\ b=\frac{r}{r} \end{cases}$$

$$a = b - r \Rightarrow a = -\frac{1}{r}$$

$$a+b = \frac{r}{r} - \frac{1}{r} = \boxed{1}$$

✓

-ε

$$\sqrt{f(n)-n} \geq 0 \rightarrow n \geq 0 \rightarrow r(n-r)n \geq 0$$

-a

↓

$$n < 1 \rightarrow r(n+r-n) \geq 0$$

$$n+r \geq 0$$

$$n \geq -r$$

$$[-r, 1)$$

$$r(n-r) \geq 0$$

$$r(n-1) \geq 0$$

$$\frac{1}{-1+r} [1, +\infty)$$

$$D_f = [-r, +\infty)$$

✓

$$r \left(\sin \frac{\pi}{r} + \cos r\pi \right)^r - \varepsilon \left(\sin \frac{\pi}{r} + \cos r\pi \right)$$

✓

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

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

✓

$$f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{a+1+a-1}{a-1} = \frac{2a}{a-1} = \frac{2}{\frac{a-1}{a}} = \infty$$

$\Rightarrow$ برای هر a با مقدار $a \neq 1$ به نمرج، اصفی کند

$$D = \mathbb{R} - \{1\}$$

✓

$$f'(g(a)) = -\epsilon \quad f(n) = n^2 - \epsilon n$$

-1

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

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

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

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

$$t^2 - \epsilon t + \epsilon = 0$$

$$(t - \epsilon)^2 = 0 \quad t = \epsilon = \sqrt{a^2 - 1}$$

$$a^2 - 1 = \epsilon$$

$$a = \pm \sqrt{a^2} \leftarrow a^2 = a$$

$$f(n + \epsilon) = n^2 - a(n + \epsilon) \quad f(\epsilon) \times f(-\epsilon) = ?$$

-9

$$n + \epsilon = \epsilon \rightarrow n = 1 \rightarrow f(\epsilon) = (1)^2 - a(1) + \epsilon = \epsilon$$

$$n + \epsilon = -\epsilon \rightarrow n = -\epsilon \rightarrow f(-\epsilon) = (-\epsilon)^2 - a(-\epsilon) + \epsilon = \epsilon^2$$

$$\boxed{\epsilon^2 \times \epsilon^2 = \epsilon^4}$$

$$\epsilon \cos^2 n + a \cos n = \epsilon, a$$

-10

$$\cos n = t$$

$$\epsilon t^2 + a t - \epsilon, a = 0$$

$$\wedge t^2 + 1 \cdot t - \epsilon = 0$$

$$(t - \frac{\epsilon}{\wedge})(t + \frac{1\epsilon}{\wedge}) = 0$$

$$(t - \frac{1}{\epsilon})(t + \frac{\epsilon}{\wedge}) = 0$$

$$t = \frac{1}{\epsilon}$$

$$t = -\frac{\epsilon}{\wedge}$$

$$\cos n = \frac{1}{\epsilon}$$

$$\sin^2 n = 1 - \cos^2 n$$

$$1 - \frac{1}{\epsilon^2} = \frac{\epsilon}{\wedge}$$

$$\tan^2 n = \frac{\frac{\epsilon}{\wedge}}{\frac{1}{\epsilon}} = \boxed{\epsilon}$$