

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

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

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

$D_f = \mathbb{R} - \{\pm 1, 0, -\frac{1}{2}, -\frac{1}{3}\}$

$$f(n) = \sqrt{(\frac{1}{n})^2 - 9} \rightarrow \frac{1}{n^2} - 9 \rightarrow \frac{1 - 9n^2}{n^2} \rightarrow \frac{(1-3n)(1+3n)}{n^2}$$

$$n \in [1, 12], y = (1 - \sqrt{1-n})^2 - 1$$

$$f(n) = \frac{\log \varepsilon}{\sqrt{n-1} + 1} \rightarrow a+b \rightarrow \frac{-1}{-\frac{1}{2} - (r)}$$

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

$$f(n) = \sqrt{a+n-n^2} \rightarrow D_f = [-r, \frac{r}{2}] \quad | \quad a+b = ?$$

$$n=-r \rightarrow -ra-1=0 \rightarrow a=-\frac{1}{r} \Rightarrow \sqrt{r-\frac{1}{r}n-n^2} \rightarrow -\frac{r}{2} - \frac{1}{2r}n + r, 0$$

$$n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow \frac{\frac{1}{r} \pm \frac{r}{2}}{-r} \rightarrow \frac{\frac{1}{r}}{-r} = (-\frac{1}{r^2})$$

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

$$f(n) = \begin{cases} rn-r & n \geq 1 \\ rn+r & n < 1 \end{cases} \quad g(n) = \sqrt{f(n) - n}, \quad Dg = ?$$

صورت $(n \geq 1) \rightarrow rn-r-n \geq 0 \rightarrow rn-r \geq 0 \rightarrow n \geq 1$

صورت $(n < 1) \rightarrow rn+r-n \geq 0 \rightarrow n \geq -r \rightarrow [-r, 1]$

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

$$f(n) = r^n - \varepsilon n \quad / \quad f\left(\sin \frac{\pi}{r} + \cos \frac{\pi}{r}\right) = ?$$

↓

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

$$r\left(1 + \frac{\sqrt{r}}{r}\right)^2 - \varepsilon\left(1 + \frac{\sqrt{r}}{r}\right)$$

$$r + \frac{r}{r} + r\frac{\sqrt{r}}{r} - \varepsilon - \varepsilon\frac{\sqrt{r}}{r} \rightarrow \frac{r}{r} - \frac{\varepsilon}{r} = \boxed{-\frac{1}{r}} \quad \text{✓}$$

6

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

$$f\left(\frac{r(a)}{f}\right) = a$$

$$f\left(\frac{a+1}{a-1}\right) \rightarrow \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = a \rightarrow \frac{\frac{r a}{a-1}}{\frac{r}{a-1}} = \left\{ \begin{array}{l} a \neq 1 \\ a \neq -1 \end{array} \right\}$$

با اعداد صحیح به جز 1 و -1

$$Df = 1r - \{+1\}$$

7

$$f(n) = n^2 - \varepsilon n$$

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

(t)

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

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

$$t^2 - \varepsilon t + \varepsilon = 0 \rightarrow (t - \varepsilon)^2 = 0 \rightarrow \boxed{t = \varepsilon}$$

a = ?

$$\left\{ \begin{array}{l} a^2 - 1 > 0 \\ a^2 - 1 \geq 1 \end{array} \right\} \rightarrow \boxed{a = \pm \sqrt{2}} \rightarrow a^2 = 2 \rightarrow a^2 - 1 = 1 \rightarrow \sqrt{a^2 - 1} = 1$$

8

$$f(n+5) = n^2 - 8n + 4$$

$$f(5) \times f(-5) = ? \rightarrow 2 \times 12 = \boxed{24} \quad \text{✓}$$

$$f(5) \rightarrow n=1 \rightarrow f(5) = 1 - 8 + 4 = \boxed{-3}$$

$$f(-5) \rightarrow n=4 \rightarrow f(-5) = (-4)^2 - 8(-4) + 4 = \boxed{44}$$

9

$$f(\varepsilon \cos^2 n + 8 \cos n) = \tan^2 n \rightarrow f(\varepsilon, 8) = ?$$

$$\varepsilon \cos^2 n + 8 \cos n - \varepsilon, 8 = 0 \rightarrow \varepsilon t^2 + 8t - \varepsilon = 0 \rightarrow \frac{\Delta}{4\varepsilon^2} = \frac{64 + \varepsilon^2}{4\varepsilon^2} \rightarrow \Delta = 64 + \varepsilon^2 = \boxed{100}$$

$$(60 \pm 20) \cos n \neq \frac{\sqrt{100}}{2} \rightarrow t = \frac{\sqrt{100}}{2} = 5$$

$$\frac{\sin^2 n}{\sin^2 n} = \frac{1 - \cos^2 n}{1 - \frac{1}{2}} = \boxed{\frac{1}{2}}$$

$$(100) \cos n = \frac{1}{2} \rightarrow t = \boxed{\frac{1}{2}}$$

$$\Delta = 100 + \varepsilon^2 = \boxed{100}$$

10

$$\tan^2 n = \frac{\sin^2 n}{\cos^2 n} = \frac{\frac{1}{2}}{\frac{1}{2}} = \boxed{1} \quad \text{✓}$$