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$$f(n) = \sqrt{\frac{n-1}{n}} - \frac{n}{n-1} \Rightarrow \frac{n-1}{n} - \frac{n}{n-1} \geq 0 \Rightarrow \frac{(n-1)^2 - n^2}{n(n-1)} \geq 0$$

$$\Rightarrow \frac{n^2 - 2n + 1 - n^2}{n(n-1)} \geq 0 \Rightarrow \frac{-2n + 1}{n(n-1)} \geq 0$$

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

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

$$\Rightarrow \frac{n+1}{(n-1)(n+1)} \neq 0 \rightarrow n \neq -\frac{1}{2} \quad D_f = \mathbb{R} - \left\{0, -1, 1, -\frac{1}{2}, -\frac{1}{4}\right\}$$

$$Q \cap Q \rightarrow D_f = \left(-\frac{1}{2}, -\frac{1}{4}\right) \cup (1, +\infty)$$

$$f(n) = \sqrt{\left(\frac{1}{n}\right)^n - 9} \left(3n - \frac{1}{n}\right) \Rightarrow \left[\left(\frac{1}{n}\right)^n - 9\right] \left(3n - \frac{1}{n}\right) \geq 0$$

		$-\frac{1}{2}$	$\frac{1}{2}$
$\left(\frac{1}{n}\right)^n - 9$	+	0	-
$3n - \frac{1}{n}$	+	+	0
$\left(\frac{1}{n}\right)^n - 9 \left(3n - \frac{1}{n}\right)$	+	0	+

$$D_f = (-\infty, -\frac{1}{2}] \cup \left[\frac{1}{2}, +\infty\right)$$

جدوی رادیکال بدتر باشد صفر $\rightarrow \sqrt[n]{n-1} + \sqrt[n]{n-1} = 2 \Rightarrow \sqrt[n]{n-1} = 1 \Rightarrow n-1 = 1 \Rightarrow n = 2$

$\sqrt[n]{n-1} \geq 0 \rightarrow \sqrt[n]{n-1} \leq 1 \Rightarrow n-1 \leq 1 \Rightarrow n \leq 2$ $n-1 > 0 \Rightarrow n > 1$

$D_f \subset [1, 2]$

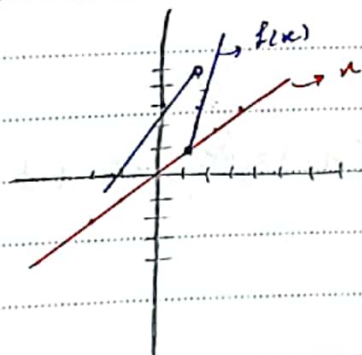
$f(n) = \log_e \frac{(n^2 - n - 2)}{\sqrt{n^2 - 1} + 1}$ $n^2 - n - 2 > 0 \Rightarrow (n-2)(n+1) > 0$ ④ - ۳

$n^2 - 1 > 0 \Rightarrow n^2 > 1 \Rightarrow n > 1$ ① $D_f \subset (-\infty, -1) \cup (1, +\infty)$

$f(n) = \sqrt{3 + an - n^2} \Rightarrow -n^2 + an + 3 \geq 0$ ⑤ - ۳

$a = -2, -2 - 2a + 3 = 0 \Rightarrow 2a = -1 \Rightarrow a = -\frac{1}{2}$

$g(n) = \sqrt{f(n) - n} \rightarrow f(n) - n \geq 0 \Rightarrow f(n) \geq n$ ⑥ - ۳



$2n + 3 \geq n \Rightarrow n \geq -3$
 $D_f \subset [-3, +\infty)$

$f(a) = (a+1)(a+2) = V(a+1) = Va + V$

$2f(a) = f(-2) + a \Rightarrow 2a(Va + V) = f(-2) + a \Rightarrow 1(a+1) = f(-2) + a$

$\Rightarrow f(-2) = Va + 1$ $f(-2) = Va - 1 \Rightarrow Va + 1 = Va - 1$
 $\Rightarrow 1 = -1$

$$\frac{1}{r-\sqrt{r}} \propto \frac{r+\sqrt{r}}{r+\sqrt{r}} = r+\sqrt{r}$$

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

5- V

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

$$f(n) + f\left(\frac{1}{n}\right) = \sqrt{n} + \frac{1}{\sqrt{n}} + r + \sqrt{\frac{1}{n}} + \frac{1}{\sqrt{\frac{1}{n}}} + r = r + 2\sqrt{n} + \frac{r}{\sqrt{n}}$$

$$r + 2\left(\sqrt{n} + \frac{1}{\sqrt{n}}\right) = r + 2\sqrt{n}$$

$$\frac{n+1}{\sqrt{n}} \rightarrow 5$$

$$5 \cdot \frac{r^2(r-\sqrt{r})^2}{r-\sqrt{r}} \times \frac{r+\sqrt{r}}{r+\sqrt{r}} = (1r-4\sqrt{r})(r+\sqrt{r}) =$$

$$r^2 + 1r\sqrt{r} - 4r\sqrt{r} - 4r = r^2 - 3r\sqrt{r} - 4r \rightarrow 5 = \sqrt{4}$$

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$$= r + \sqrt{4-3\sqrt{r}} - \sqrt{4+3\sqrt{r}} + r\sqrt{r-\sqrt{r}} + r\sqrt{r+\sqrt{r}} \quad 5- V$$

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$$\begin{cases} (rf(n) - rf(-n) = \epsilon n^r - n) \times r \\ (rf(-n) - rf(n) = \epsilon n^r + n) \times r \end{cases} \Rightarrow \begin{cases} rf(n) - rf(-n) = \epsilon n^r - n \\ -rf(n) + rf(-n) = \epsilon n^r + n \end{cases}$$

$$- \epsilon f(n) = r \cdot n^r + n$$

$$\rightarrow f(n) = -\epsilon n^r - \frac{n}{\epsilon}$$

$$(n+r)f(n) - rn f(n+r) = \epsilon n^r - mn + rm - 1$$

$$\xrightarrow{n \rightarrow 0} rf(0) = rm - 1 \xrightarrow{n \rightarrow -r} rf(-r) = 1 + rm + rm - 1 = 2rm + 1$$

$$\Rightarrow r(2rm - 1) = 2rm + 1 \Rightarrow 2rm - r = 2rm + 1 \Rightarrow$$

$$\Rightarrow \epsilon m \geq 1 \Rightarrow m \geq \frac{1}{\epsilon} = \frac{1}{r} \Rightarrow$$

$$\Rightarrow rf(0) = \frac{r}{r} - 1 = \frac{r}{r} \Rightarrow f(0) = \frac{r}{r}$$

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$$f(n) + f\left(\frac{1}{n}\right) = 3n^2 - \frac{12n + 3}{n} \quad \text{and} \quad f(n) = an + b + \frac{a}{n} + b = \frac{3n^2 - 12n + 3}{n}$$

$$\Rightarrow an^2 + bn + a = 3n^2 - 12n + 3 \Rightarrow a = 3 \quad b = -4$$

$$\boxed{f(n) = 3n - 4 \rightarrow f(-1) = -3 - 4 = -7}$$

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