

۲. آفرین های نوستر

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

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

$\frac{1}{n-1} \quad \frac{1}{n}$
+ $\frac{1}{n-1} + \frac{1}{n}$ -

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

ب) $f(n) = \frac{\frac{1}{n+1} - \frac{2}{n}}{\frac{3}{n-1} + \frac{1}{n+2}}$

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

$\frac{3}{n-1} \neq -\frac{1}{n+2} \Rightarrow 3n+1 \neq -n$
 $\Rightarrow f(n) \neq -\infty \Rightarrow n \neq -\frac{5}{4}$

$\Rightarrow n \neq -\frac{5}{4} \Rightarrow Df = \mathbb{R} - \{-1, 0, 1, -2, -\frac{5}{4}\}$

الف) $f(n) = \sqrt{((\frac{1}{n})^n - 9)(32 - 4^n)}$

$\frac{-2}{n} \quad \frac{4^n}{n}$
+ $\frac{1}{n} - \frac{4^n}{n}$ +

$\Rightarrow Df = (-\infty, -2] \cup [\frac{4}{3}, +\infty)$

ب) $\sqrt{n-1} + \sqrt{y+1} = 3 \Rightarrow \sqrt{y+1} = 3 - \sqrt{n-1} \Rightarrow \sqrt{y+1} \geq 0$

$\Rightarrow \sqrt{n-1} \leq 3 \Rightarrow n-1 \leq 9 \Rightarrow n \leq 10 \Rightarrow Df = [1, 10]$
 $n > 1$

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

$n^2 - n - 2 > 0 \Rightarrow (n-2)(n+1) > 0$

$Df = (-\infty, -1) \cup (\frac{1}{2}, +\infty)$

$\sqrt{n^2 - 1} \Rightarrow n^2 \geq 1 \Rightarrow n \geq 1$

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

$f(n) = \sqrt{3 + an - n^2}$

$[-2, b] \Rightarrow an^2 + bn + c \Rightarrow s = -\frac{b}{a}, p = \frac{c}{a}$

$\Rightarrow b + (-2) = a \quad 9 - 2b = -3 \Rightarrow b = \frac{3}{2} \quad a = -\frac{1}{2} \Rightarrow -\frac{1}{2} + \frac{3}{2} = 1$

$\begin{cases} 3n - 2 \geq n \Rightarrow 2n \geq 2 \Rightarrow n \geq 1 \\ 2n + 3 \geq n \Rightarrow n \leq -3 \Rightarrow -3 \leq n < 1 \end{cases}$
 $f(n) \geq n$

$Dg = [-3, +\infty)$

$$f(n) = n^2 - 2n \Rightarrow f\left(\sin \frac{\pi}{4} + \cos \frac{\pi}{4}\right) = ?$$

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$$\Rightarrow f\left(\frac{\sqrt{2}}{2} + 1\right) \Rightarrow 2\left(\frac{\sqrt{2}}{2} + 1\right)^2 - 2\left(\frac{\sqrt{2}}{2} + 1\right) \Rightarrow \frac{3}{2} + \sqrt{2} + 2 - \sqrt{2} - 2 = \frac{3}{2}$$

$$\Rightarrow \frac{3}{2} - 2 = -\frac{1}{2}$$

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

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$$\Rightarrow \frac{a+1+\frac{a+1}{a-1}}{\frac{a+1}{a-1}-1} = \frac{1a}{1} = a$$

به ازای هر مقدار a $\Rightarrow D_f = \mathbb{R} - \{1\}$

$$f(g(a)) = a \Rightarrow f(\sqrt{a^2-1}) \Rightarrow a^2 - 1 - f\sqrt{a^2-1} + f = 0$$

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$$\Rightarrow \sqrt{a^2-1} = t \Rightarrow t^2 - 2t + 2 = 0 \Rightarrow (t-1)^2 = 0 \Rightarrow t = 1$$

$$\Rightarrow \sqrt{a^2-1} = 1 \Rightarrow a^2 = 2 \Rightarrow a = \begin{cases} \sqrt{2} \\ -\sqrt{2} \end{cases}$$

$$f(n+r) = n^2 - 2n + 1 \Rightarrow n+r = -2 \Rightarrow n = -2-r \Rightarrow f(-2-r) = (-2-r)^2 - 2(-2-r) + 1 = 1+r$$

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$$f(n+r) = n^2 + 2n + 1 \Rightarrow n+r = 1 \Rightarrow n = 1-r \Rightarrow f(1-r) = (1-r)^2 + 2(1-r) + 1 = 2-r$$

$$f(r) \times f(-r) = r \times 1 = r$$

$$f \cos^2 x + 2 \cos x = \frac{1}{f} \Rightarrow \cos x = \frac{1}{f} \Rightarrow \tan^2 x = (f^2 - 1) \Rightarrow \tan x = \sqrt{f^2 - 1}$$

$$\hookrightarrow \cos x = -\frac{1}{f}$$

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