

۲. آنالیز برای دیکامل نوستر

فرانز صالکی - سیم و تعلیق : ۲

① $r f(x) = f(-x) + a$
 $f(n) = \begin{cases} (a+1)(n+2) & n \geq 1 \\ 3a+2x & n \leq 1 \end{cases} \rightarrow \forall (a+v) \times 2 = 3a-2+a$
 $a = ? \rightarrow 1 \cdot a = -1 \rightarrow \boxed{a = -1}$ ✓ ۲

② $f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + 2$ / $f(x-\sqrt{x}) + f(x+\sqrt{x}) = ?$ $\begin{cases} a = \sqrt{x-\sqrt{x}} \\ b = \sqrt{x+\sqrt{x}} \end{cases} \rightarrow a+b=1 \rightarrow \frac{1}{a}=b$
 $a + \frac{1}{a} + 2 \rightarrow a+b+2$
 $b + \frac{1}{b} + 2 \rightarrow a+b+2$
 $\Rightarrow 2(a+b) + 4 \rightarrow 2\sqrt{4} + 4 = 2 \cdot 2 + 4 = 8$ ✓ ۲

$(a+b)^2 = a^2 + b^2 + 2ab$
 $(\sqrt{x-\sqrt{x}} + \sqrt{x+\sqrt{x}})^2 = (x-\sqrt{x}) + (x+\sqrt{x}) + 2\sqrt{(x-\sqrt{x})(x+\sqrt{x})}$
 $= 2x + 2\sqrt{x^2 - x} = 2x + 2\sqrt{x(x-1)}$

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③ $f(n) = ?$ / $r f(n) - r f(-n) = \varepsilon n^2 - x \xrightarrow{\times 2} \varepsilon f(n) - r f(-n) = 2n^2 - 2x$
 $x, -x \rightarrow r f(-n) - r f(n) = \varepsilon n^2 + x \xrightarrow{\times 2} 4r f(-n) - 4r f(n) = 4n^2 + 2x$
 $-8f(n) = 2n^2 + x$
 $f(n) = -\frac{\varepsilon n^2}{4} - \frac{x}{8}$ ✓ ۲

④ $(n+2)f(n) - \varepsilon n f(n+2) = \varepsilon n^2 - nx + \varepsilon m - 1$ / $f(1) = ?$

$x=0 \rightarrow r f(1) = \varepsilon m - 1 \xrightarrow{\times 2} 4f(1) = 4m - 2$
 $x=-2 \rightarrow 4f(1) = 14 + \varepsilon m + \varepsilon m - 1 \rightarrow 4f(1) = 13 + 2\varepsilon m$
 $\Rightarrow 4m - 2 = 13 + 2\varepsilon m$
 $\varepsilon m = 18 \rightarrow m = 18/\varepsilon \rightarrow f(1) = \frac{\varepsilon m - 1}{4} = \frac{18 - 1}{4} = \frac{17}{4}$ ✓ ۲

⑤ $f(n) + f(\frac{1}{n}) = \frac{\varepsilon n^2 - \varepsilon n + \varepsilon}{n}$ / $f(-1) = ? \xrightarrow{\frac{1}{-1}} -a+b = ?$

$x=-1 \rightarrow f(-1) + f(-1) = \frac{\varepsilon + \varepsilon + \varepsilon}{-1} \rightarrow 2f(-1) = -3 \rightarrow \boxed{f(-1) = -1.5}$ ✓ ۲

⑥ $Df = x \leq 1$
 $Dg = x \leq 1 \rightarrow Df = Dg, Rf = Rg \rightarrow f(n) = g(n)$ ✓ ۲

⑦ $Df = x_{7,0} \rightarrow Df = Dg \rightarrow Rf = Rg \rightarrow f(x) = g(x)$ ✓

⑧ $Df = x_{7,0} \rightarrow Dg = x_{7,0}$
 استناد به عبارت زیر در بیان هر دو قیاس است (این مفروضه)
 هم‌زمان برابری و صفری دهه.
 عبارت زیر در بیان صفری دهه!
 تابع برابری ✓

⑨ الف) $\frac{f(1) + g(1)}{f(1) - g(1)} \rightarrow \frac{2+1}{2-1} = 3$ / $\frac{f(2) + g(2)}{f(2) - g(2)} \rightarrow \frac{4+2}{4-2} = 3$ (X)
 ب) $f(1) \times g(-1) \rightarrow 0 \times 1 = 0$ ✓

⑩ الف) $g(x) = f(x_{n-1}) \rightarrow$

$$\begin{cases} x_{n-1} = 2 \rightarrow x = 1 \rightarrow g(1) = 1 \\ x = -1 \rightarrow x = 0 \rightarrow g(0) = 2 \\ x = 0 \rightarrow x = \frac{1}{2} \rightarrow g(\frac{1}{2}) = 2 \\ x = -2 \rightarrow x = -\frac{1}{2} \rightarrow g(-\frac{1}{2}) = 2 \\ x = 3 \rightarrow x = \frac{2}{3} \rightarrow g(\frac{2}{3}) = -1 \end{cases}$$

$g = \{ (1, 1), (0, 2), (\frac{1}{2}, 2), (-\frac{1}{2}, 2), (\frac{2}{3}, -1) \}$

ب) $h(x) = f(|x|)$

$|x| = 2 \rightarrow x = \begin{cases} +2 \rightarrow y = 1 \rightarrow h(2) = 1 \\ -2 \rightarrow y = 1 \rightarrow h(-2) = 1 \end{cases}$

~~$|x| = 1$~~

$|x| = 0 \rightarrow x = 0 \rightarrow y = 2 \rightarrow h(0) = 2$

~~$|x| = -2$~~

$|x| = 3 \rightarrow x = \begin{cases} +3 \rightarrow y = -1 \rightarrow h(3) = -1 \\ -3 \rightarrow y = -1 \rightarrow h(-3) = -1 \end{cases}$

$h(x) = \{ (2, 1), (-2, 1), (3, -1), (-3, -1) \}$