Date : / /   ۲۰ آفرین   Subject : ریاضی جلیل عاملی پایه

①

$a_1 = 40 \quad a_4 = a_1 + 3d = 61 \Rightarrow 3d = 61 - 40 = 21 \quad d = 7$

$40 + (n-1)7 = 208 \Rightarrow 33 + 7n = 208 \Rightarrow 7n = 175 \Rightarrow n = 25$ ✓ (۲)

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②

$100 \leq 7n + 3 \leq 999 \Rightarrow 97 \leq 7n \leq 996 \Rightarrow 13/\ldots \leq n \leq 142/\ldots \Rightarrow \frac{142 - 14}{1} + 1 = 129$ ✓ (۲)

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③

$a_{n+2} = \frac{a_{n+3} + a_{n+1}}{2}$

$\begin{cases} a_2 + a_3 + a_4 = +6 \\ a_3 + a_4 + a_5 = 0 \end{cases} \quad \begin{cases} 3a_1 + 6d = 6 \\ 3a_1 + 9d = 0 \end{cases} \Rightarrow 3d = -6 \quad \boxed{d = -2}$

$3a_1 = 18 \quad \boxed{a_1 = 6}$

$a_8 + a_{17} = 2a_1 + 23d = 12 + 23(-2) = -34$ ✓ (۲)

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④

$2^{n+1} = \frac{2^n - 1 + 2^{2n} - 3}{2} \Rightarrow 2 \times 2^{n+1} = 2^n + 2^{2n} - 4$

$2^{2n} - 4 \times 2^n + 2^n - 4 = 0 \Rightarrow 2^{2n} - 3 \times 2^n - 4 = 0 \quad 2^n = y$

$y^2 - 3y - 4 = 0 \Rightarrow \begin{cases} y = +4 \Rightarrow 2^n = 4 \Rightarrow \boxed{n = 2} \Rightarrow 2^2 - 1 + 2^4 - 3 = 16 \\ y = -1 \text{ غق} \end{cases}$ ✓ (۲)

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⑤

$a_{12} - a_{10} = 5 \rightarrow d = 2/5$

$a_1 + 9d + a_1 + 11d = 25$

$2a_1 + 20 \times 2/5 = 25 \Rightarrow 2a_1 = -25 \quad a_1 = -12/5$

$-12/5 + 20 \times \frac{25}{10} = 37/5$ ✓ (۲)

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⑥

~~$a_1 + a_1 + d + a_1 + 2d + a_1 + 3d + a_1 + 4d = \ldots$~~

~~$3(5a_1 + 10d) = \ldots$~~

$a_1 + a_1 + d + a_1 + 2d + a_1 + 3d + a_1 + 4d = \frac{1}{3}(a_1 + 5d + a_1 + 6d + a_1 + 7d + a_1 + 8d + a_1 + 9d)$

$\Rightarrow 5a_1 + 10d = \frac{1}{3}(5a_1 + 35d) \Rightarrow 15a_1 + 30d = 5a_1 + 35d$

$\Rightarrow 10a_1 = 5d \Rightarrow \boxed{d = 2a_1}$

$\frac{a_2}{a_1} = \frac{a_1 + d}{a_1} = \frac{a_1 + 2a_1}{a_1} = 3$ ✓ (۲)

Date : / /   Subject :

(۷)

$t_n - t_{n-3} = 12$ $\quad 3d = 12 \quad d = 4$

$t_9 + t_5$ ... لیست داده‌های ۲ ← ۲۷

$(t_9 - t_5)(t_9 + t_5) = 8d \to 8 \times 5 = 40$ پ.م

✓ (۲)

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(۸)

$$\frac{-2(1-6\sqrt{3}) + 2 + \sqrt{3}}{12+1} = \frac{-2 + 12\sqrt{3} + 2 + \sqrt{3}}{13} = \frac{13\sqrt{3}}{13} = \sqrt{3}$$

✓ (۲)

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(۹)

$$\frac{32-2}{4n+1-3} = \frac{30}{4n-2} = d \qquad a_1 = 2 \qquad a_1 + nd = 11$$

$nd = 9$

$10n = 12n - 6 \qquad 2n = 6 \quad (n = 3) \qquad n = 9 \times \frac{4n-2}{30} \quad \frac{12n-6}{10} = n$ ✓

(۲)

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(۱۰)

$a_n + a_{n+4} = a_3 + a_{17} \Rightarrow n + n + 4 = 20 \Rightarrow n = 8$

$a_8 = 3a_4 \Rightarrow a_1 + 7d = 3(a_1 + 3d) \Rightarrow \boxed{d = -a}$

$a_2 = a_1 + d = a_1 + (-a) = 0$ ✓ روش جالب

(۲)