مهدی موسوی — به نام خدا — ۲۵ عالی نوشتن! — دهم

① الف) $a_n = 4n+1$ ✓ (۲)

ب) $a_{10} = 4(10)+1 = 41$ ✓

۱۳، ۴۹، ۵ ($\div 4$)

② الف) $S_{10} = \frac{10}{2}\left((2\times 6)+(9)4\right) = 240$ ✓ (۲)

ب) $a_{29}+a_{30}+a_{31}+a_{32} \to 118+122+126+130 = 496$ ✓

③ $d = \frac{t_n - t_m}{n-m} \to d = \frac{2-(1+\sqrt{3})}{1} \Rightarrow d = 1-\sqrt{3}$

$a_{25} - a_{23} = 2d = 2(1-\sqrt{3}) = 2-2\sqrt{3}$ ✓ (۲)

④ $a_n = 25^x + 5^y = 6\times 25^x \to 5^y = 5(25^x) \to y = 2x+1$

$x y = 1\times 3 = 3$ ✓ (۲)

$b_n = x+y = 4 \to \begin{cases} y = 4-x \\ y = 2x+1 \end{cases} \to 4-x = 2x+1 \to 3 = 3x \to \boxed{x=1}\ \boxed{y=3}$ ✓

⑤ $a, b, c \to 2b = a+c \to 4x-2 = 2x-4+6x \to 2 = 4x \to x = \frac{1}{2}$ ✓ (۲)

$-3, 0, 3, \dots \to d = 3$ $\quad a_4 = a_1+3d \to -3+3(3) = \boxed{6}$ ✓

⑥ $a_n = 3, 5, 7 \to d = 2$; $\to 2n+1 \to a_{20} = 41$

$b_n = 2, 5, 8 \to d = 3$; $\to 3n-1 \to a_{20} = 59$

$\xrightarrow{\text{کم}} 6 \to 5, 11, 17, \dots \to \boxed{a_n = 6n-1}$ (۲)

$5 \le 6n-1 \le 41$

$1 \le n \le 7 \to$ ۷ جمله مشترک ✓

⑦ $a_1 + a_1 + d + a_1 + 2d = 21$

$a_1 + a_1 + 2d + a_1 + 4d = 105$

$\to d + 2d = 84 \to d = 28,\ a_1 = -21$ (۲)

$\frac{a_1 + 2d - (a_1+d) + a_1}{a_1} = \frac{a_1+d}{a_1} \to \frac{-21+28}{-21} = \frac{7}{-21} = -\frac{1}{3}$ ✓

⑧ $a_1+a_2+a_3+a_4+a_5 = 40 \to 5a_3 = 40 \to \boxed{a_3 = 8}$

$a_{10} = a_3 + 7d \Rightarrow 8+7(3) = 29$ ✓ (۲)

$a_c + d + a_c + 2d = 25 \to 2a_c + 3d = 25 \to 16 + 3d = 25 \to \boxed{d = 3}$

⑨ $\frac{9}{2}(2a_1+8d) = 9\times\frac{3}{2}(2a_1+2d) \Rightarrow 2a_1 + 8d = 3(2a_1+2d) = 6a_1+6d \to d = 2a_1$ (۲)

$a_7 = a_1+6d \to a_7 = a_1+6(2a_1) = 13a_1$

$a_{20} = a_1+19d \to a_1+19(2a_1) = 39a_1$

$\to \frac{39a_1}{13a_1} = \frac{a_{20}}{a_7} = \frac{39}{13} = 3$ ✓

⑩ $a_1 = 11,\ a_7 = a_1+6d = 35 \to \boxed{d = 4} \to a_4 = a_1+3d = 23$

$d_2 = \frac{38-13}{n+1} = -\frac{25}{n+1} \to a'_4 = 38+3d_2 = 38-\frac{75}{n+1} = 23 \to \frac{75}{n+1} = 15 \to n = 4$ ✓ (۲)

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