

$$a_{10} = 5 + (10-1)2 = 5 + (9 \times 2) = 5 + 18 = 23$$

(ب) $t_1 = 5$

$d = 2$

$t_1 + (n-1)d \Rightarrow 5 + (n-1)2$

(الف)

(ب) $9, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, \dots$

$\frac{9}{19}, \frac{22}{19}, \frac{31}{19}, \dots \Rightarrow 9 + (n-1) \times 19$

$9 + (1-1) \times 19 = 111 \Rightarrow 111, 122, 134, 146, \dots$

$111 + 122 + 134 + 146 = 513$

(الف) $S_n = \frac{n}{2} (a_1 + a_n)$

$a_{10} = 9 + (10-1) \times 19 = 180$

$a_1 = 9$

$S_n = \frac{10}{2} (9 + 180) = 945$

(الف)

$d = 2 - (1 + \sqrt{3}) = 1 - \sqrt{3}$

$t_1 = 1 + \sqrt{3}$

$a_{23} - a_{25} = 1 + \sqrt{3} + (1 - \sqrt{3}) \times 22 - \{1 + \sqrt{3} + (1 - \sqrt{3}) \times 24\} = 1 + \sqrt{3} + 22 - 22\sqrt{3} - 1 - \sqrt{3} - 24 + 24\sqrt{3} = -2 + 2\sqrt{3}$

$\frac{x+y}{2} = 2 \Rightarrow x+y = 4$

$\frac{\Delta^2 x \Delta^2 y}{2} = 2 \times 2 \Delta^2 \Rightarrow \Delta^2 x + \Delta^2 y = 4 \times \frac{\Delta^2 x}{\Delta^2 x} \Rightarrow \Delta^2 y = \Delta^2 x (4-1) \Rightarrow \Delta^2 y = \Delta^2 x + 1 \Rightarrow y = 2x + 1$

$2-x = 2x+1 \Rightarrow 3x = 1 \Rightarrow x = \frac{1}{3} \Rightarrow y = \frac{5}{3}$
 $xy = 1 \times \frac{5}{3} = \frac{5}{3}$

$2x-3, 2x-1, 4x$
 $+3 \quad +2x+1$

$2x+1 = 3 \Rightarrow x = 1 \Rightarrow -3, 0, 3 \Rightarrow t = -3, d = 3 \Rightarrow a_4 = t + (n-1)d \Rightarrow -3 + (3-1) \times 3 = 3$

$$\begin{aligned}
 a_n &\Rightarrow t=2, d=2 \Rightarrow 2+(n-1)2 \Rightarrow 2+19 \times 2 = 40 & a_n < 41 \\
 b_n &\Rightarrow t=2, d=3 \Rightarrow 2+(n-1)3 \Rightarrow 2+19 \times 3 = 59 & b_n < 59 \\
 c_n &= 5, 11, 17, \dots \Rightarrow t=5, d=6 \Rightarrow 5+(n-1)6 < 41 \Rightarrow 5+6n-6 < 41 \Rightarrow 6n < 42 \Rightarrow n < 7
 \end{aligned}$$

انتهای مشترک $\Rightarrow c_n < 41$
 که غرضهای مشترک

$$\begin{aligned}
 3t+2d &= 21 \Rightarrow t+d=7 \\
 3t+4d &= 10 \Rightarrow t+d=2d \Rightarrow d=3d-7=21 \Rightarrow d=7 \\
 a_1 &= -11 \\
 a_3 - a_2 + a_1 &= t+d = -11+7 = -4 \Rightarrow \frac{-4}{-1} = 4
 \end{aligned}$$

$$\begin{aligned}
 t+t+d+t+d &= 3t+2d = 10 \Rightarrow t+d=5 \xrightarrow{\times 2} 2t+4d=10 \\
 t+2d+t+2d &= 2t+4d=20 \\
 a_9 &= t+8d \Rightarrow \frac{10}{5} + 8 \times \frac{10}{5} = \frac{10+80}{5} = \frac{90}{5} = 18
 \end{aligned}$$

$$\begin{aligned}
 S_9 &= 4S_3 \Rightarrow \frac{9}{2}(a_1+a_9) = \frac{4 \times 9}{2}(a_1+a_3) \Rightarrow a_1+a_9 = 4a_1+4a_3 \Rightarrow t+t+8d = 2t+2t+6d \Rightarrow 8d = 6d \Rightarrow d=0 \\
 \frac{a_9}{a_7} &= \frac{t+8d}{t+6d} = \frac{t+14d}{t+6d} = \frac{t}{t} = 1
 \end{aligned}$$

$$\begin{aligned}
 t=11 \quad t+9d &= 30 \quad 9d=19 \Rightarrow d=2 \Rightarrow 11, 13, 15, 17, 19, 21, 23 \\
 t=21 &\Rightarrow d=0 \Rightarrow 21, 22, 23, 24 \\
 \frac{a_n - a_1}{n-1} &= \frac{20}{n-1} \Rightarrow d=4
 \end{aligned}$$