

$$d=4 \Rightarrow a_n = 4n+1 \quad \& \quad z_n = 4n+1$$

(الف)

$$a_{10} = (4 \times 10) + 1 = 41 \quad \& \quad z_{10} = 41$$

$$d=4 \Rightarrow z_n = 4n+4$$

$$S_n = \frac{n}{2} (2a_1 + (n-1)d) \Rightarrow S_{10} = \frac{10}{2} (2 \times 4 + 9 \times 4) = 5 \times 40 = 200$$

(ب)

$$a_1 + a_2 + a_3 + a_4 = 2(a_1 + a_4) = 2(a_1 + 20) = 2(21) = 42$$

$$a_1 + a_2 + a_{10} + a_{11} = 0 \Rightarrow S_{a_1-a_{11}} = \frac{n}{2} (a_1 + a_{11}) = \frac{4}{2} (a_1 + a_{11}) = 2(21 + 20) = 82$$

$$a_1 = (4 \times 1) + 1 = 5$$

$$a_{11} = (4 \times 11) + 1 = 45$$

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

$$a_{10} - a_{12} = 2d \Rightarrow a_{10} - a_{12} = 2 - 2\sqrt{2}$$

$$a_{10} - a_{12} = a_1 + 9d - a_1 - 11d = 2d$$

$$a_2 - a_1 = a_3 - a_2 \Rightarrow 3(a_2) - a_2 = 5 - (a_2)3 \Rightarrow 2(a_2) - a_2 = 5 \Rightarrow$$

$$4(a_2) - a_2 = 5 \Rightarrow 5 = \frac{a_2 + 1}{(a_2) \times 5} \Rightarrow y = 2x + 1$$

$$b_2 - b_1 = b_3 - b_2 \Rightarrow 2 - x = y - 2 \Rightarrow -x + y + 1 = 4 \Rightarrow -x + y = 3 \Rightarrow x = 1 \Rightarrow y = 4$$

$$xy = 3x + 1 = 4$$

$$d = a_2 - a_1 = a_3 - a_2 \Rightarrow a_2 - a_1 = -(1x-2) + (2x-1) = -1x + 2 + 2x - 1 = x + 1$$

$$fx = 2 \Rightarrow x = \frac{1}{f}$$

$$d = 3 \quad 3 \quad 3$$

$$a_1 = -3, a_2 = 0, a_3 = 3, \dots \Rightarrow -3, 0, 3, \dots \Rightarrow a_4 = a_3 + 3 \Rightarrow$$

$$a_4 = 6$$

$$b_n = 2n-1, a_n = 2n+1 \Rightarrow r_1 r_2 r_3 = 4 \Rightarrow \dots \Rightarrow 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, \dots \Rightarrow \text{مستقیم}$$

$$c_n = 9n-1 \Rightarrow 9n-1 \leq 1 \Rightarrow 9n \leq 2 \Rightarrow n \leq \frac{2}{9} \Rightarrow \boxed{n=1}$$

$$a_{r_0} < b_{r_0} \Rightarrow a_{r_0} = (r_0 \times r_0) + 1 = 1 \Rightarrow \boxed{a_{r_0} = 1}$$

$$\boxed{a_{r_0} = 1} \quad \boxed{a_{r_0} = b_{r_0}}$$

$$b_{r_0} = (r_0 \times r_0) - 1 = 0$$

$$\Rightarrow b_{r_0} = 0 \Rightarrow r_0 = 1 \Rightarrow a_1 = 1, b_1 = 0, c_1 = 8 \Rightarrow \text{مستقیم}$$

$$a_1 + a_r + a_v = a_1 + (a_1 + d) + (a_1 + r d) = 3a_1 + r d = 2v \Rightarrow \frac{a_1 + d}{2} = v$$

$$a_1 + a_r + a_v = a_1 + (a_1 + r d) + (a_1 + r d) = 3a_1 + 2r d = 2(v - a_1) \Rightarrow 3a_1 + 2r d = 2v - 2a_1 \Rightarrow 5a_1 + 2r d = 2v$$

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$$a_1 + a_r + a_v = 10 \Rightarrow a_r = \frac{10}{3} = 3.33 \Rightarrow a_1 + d = 10 \Rightarrow a_1 = 10 - d$$

$$(a_1 + d) + (a_1 + 2d) + (a_1 + 3d) = 10 \Rightarrow 3a_1 + 6d = 10 \Rightarrow a_1 = \frac{10 - 6d}{3}$$

$$a_r + a_v = 10 \Rightarrow a_1 + r d + a_1 + r d = 10 \Rightarrow 2a_1 + 2r d = 10 \Rightarrow a_1 + r d = 5 \Rightarrow 2(5 - d) + 2r d = 10 \Rightarrow 10 - 2d + 2r d = 10 \Rightarrow -2d + 2r d = 0 \Rightarrow d(r - 1) = 0 \Rightarrow d = 0 \text{ or } r = 1$$

$$\Rightarrow 10 - 2d + 2r d = 10 \Rightarrow d(r - 1) = 0 \Rightarrow d = 0 \text{ or } r = 1$$

$$a_{r_0} = a_1 + r d \Rightarrow a_{r_0} = 1 + (9 \times 1) = 10 \Rightarrow \boxed{a_{r_0} = 10}$$

$$S_n = \frac{n}{2} (2a_1 + (n-1)d) \Rightarrow \frac{9}{2} (2a_1 + 8d) = \frac{9 \times 10}{2} \Rightarrow 9a_1 + 36d = 45 \Rightarrow 3a_1 + 12d = 15 \Rightarrow a_1 + 4d = 5$$

$$\Rightarrow 3a_1 + 12d = 15 \Rightarrow a_1 + 4d = 5 \Rightarrow a_1 = 5 - 4d$$

$$S_q = 4S_r \Rightarrow a_1 + r d = 3a_1 + r d \Rightarrow d = 2a_1$$

$$a_{r_0} = a_v = a_1 \Rightarrow \frac{a_{r_0}}{a_v} = \frac{a_1}{a_1} = 1 \Rightarrow \text{جواب: 1}$$

$$\frac{a_r}{a_v} = \frac{a_1 + r d}{a_1 + r d} = \frac{1 + 4d}{1 + 4d} = 1 \Rightarrow \boxed{1}$$

$$a_1 = 11, a_v = 20 \Rightarrow d = \frac{a_v - a_1}{v - 1} = \frac{20 - 11}{9} = \frac{9}{9} = 1$$

$$a_n = 2n + 1$$

$$3, 5, 7, 9, \dots, 19 \Rightarrow d = \frac{b_n - b_1}{n - 1} = \frac{19 - 3}{(n+1) - 1} = \frac{16}{n} \Rightarrow d = \frac{16}{n}$$

$$\boxed{b_n = n + 1}$$

$$\left. \begin{aligned} a_r &= a_1 + r d \\ b_r &= b_1 + r d \end{aligned} \right\} \Rightarrow a_r = b_r \Rightarrow 11 + r d = 19 + r d \Rightarrow 11 = 19 \Rightarrow \text{مستقیم}$$

$$\boxed{19 = 11 + r d \Rightarrow 8 = r d \Rightarrow r = 8, d = 1 \Rightarrow n = 19}$$

$$19 + \frac{16}{n} = 19 \Rightarrow \frac{16}{n} = 0 \Rightarrow n = \infty \Rightarrow \boxed{n = 19}$$