

$1+0 \quad 4+1 \quad 9+3 \quad 16+6 \quad \dots$
 $\Rightarrow a_n = n^2 + \frac{n(n-1)}{2} \rightarrow a_{10} = 10^2 + \frac{10(9)}{2} = 145$

$\frac{1}{0}, \frac{2}{1}, \frac{3}{3}, \frac{4}{6}, \dots \Rightarrow \frac{1}{2}n^2 - \frac{1}{2}n$

$0 \quad 1 \quad 4 \quad 9 \quad 16 \quad 25 \quad \dots$
 $\Rightarrow a_n = \frac{1}{2}n^2 - \frac{1}{2}n = \frac{n(n-1)}{2}$
 $a_n = a_n^2 + bn + c \rightarrow \forall a = 1 \rightarrow a = \frac{1}{2}$

$\text{جمله صفراوم} = c \Rightarrow c = 0$

$0 \quad 1 \quad 4 \quad 9 \quad 16 \quad 25 \quad \dots$
 $a_n = \frac{1}{2}n^2 + bn \Rightarrow a = \frac{1}{2} + b \Rightarrow b = \frac{1}{2}$
 $\frac{n(n-1)}{2} = 55 \Rightarrow n(n-1) = 110 \Rightarrow n = 11$

$a_n = a_1 + (n-1)d \Rightarrow a_n = 5 + (n-1)4 \Rightarrow a_n = 4n+1 \rightarrow a_{11} = 4(11)+1 = 45$

$a_n = 4n - 4 \rightarrow a_{11} = 44 - 4 = 40$

$0, 4, 8, \dots$

$130 = \text{مجموعه های زوج} + \text{مجموعه های فرد}$
 $185 = \text{مجموعه های زوج} + \text{مجموعه های فرد}$

$\text{بزرگترین جمله} \xrightarrow{n=2} \frac{(-1)^2}{2} = \frac{1}{2}$
 $\text{کوچکترین جمله} \xrightarrow{n=1} (-1)$
 $\Rightarrow \left| \frac{1}{2} - (-1) \right| = \frac{3}{2}$

$b_3 = (-3)^3 - 7(3) = -27 - 21 = -48 \rightarrow a_n = -5n + 22 = -48 \rightarrow -5n = -70$

$n = 14 \rightarrow k = 14$

$$\left. \begin{array}{l} a_{10} = a_1 + 9d \\ a_7 = a_1 + 6d \end{array} \right\} \xrightarrow{\text{از هم کم می کنیم}} a_{10} - a_7 = 3d \Rightarrow 3d = 12 \Rightarrow \boxed{d = 4}$$

$$\left. \begin{array}{l} a_4 = a_1 + 3d \\ a_1 = a_1 \end{array} \right\} \xrightarrow{\text{از هم کم می کنیم}} a_4 - a_1 = 3d \xrightarrow{d=4} 3d = \boxed{12}$$

$$\left. \begin{array}{l} a_7 = a_1 + d = 7 \\ a_4 = a_1 + 3d = 15 \end{array} \right\} \xrightarrow{\text{از هم کم می کنیم}} a_7 - a_4 = 2d = 1 \Rightarrow \boxed{d = \frac{1}{2}}$$

$$a_7 = a_1 + d = 7 \xrightarrow{d=4} \boxed{a_1 = 3}$$

$$a_n = 4n - 1 \rightarrow \left. \begin{array}{l} a_1 = 3 \\ a_3 = 11 \end{array} \right\} \xrightarrow{b_n} \begin{array}{c} 3, 11, \dots \\ \downarrow \quad \downarrow \\ b_1 \quad b_3 \end{array} \xrightarrow{d=1} \boxed{b_n = 4n - 5}$$

$$\text{برای سری } \rightarrow 2, 4, 10, 14, \dots \xrightarrow{d=4} \boxed{a_n = 4n - 2}$$

$\underbrace{\quad\quad\quad}_4 \quad \underbrace{\quad\quad\quad}_4 \quad \underbrace{\quad\quad\quad}_4$

$$\text{برای منجم } \rightarrow 5, 7, 9, 11, \dots \xrightarrow{d=2} \boxed{b_n = 2n + 3} \Rightarrow t_n = \frac{a_n}{b_n} = \frac{4n - 2}{2n + 3}$$

$$\Rightarrow \boxed{t_n < \frac{3}{2}} \Rightarrow$$

$$t_n = \frac{4n - 2}{2n + 3} < \frac{3}{2} \rightarrow 2 \left(\frac{4n - 2}{2n + 3} \right) < 3 \rightarrow 2(4n - 2) < 3(2n + 3) \rightarrow$$

$$8n - 4 < 6n + 9 \rightarrow 2n < 13 \rightarrow n < \frac{13}{2} \rightarrow \frac{3}{2} \text{ جمله کوچکتر از } \frac{3}{2}$$

$$t_n = 4, 9, 9, 4, \dots$$

$$\left. \begin{array}{l} 2a = -3 \rightarrow a = -\frac{3}{2} \\ A = -\frac{3}{2} \end{array} \right\} \rightarrow 3A + 5B = 3\left(-\frac{3}{2}\right) + 5\left(\frac{40}{10}\right) = \frac{94}{2} = \boxed{47}$$

$\underbrace{\quad\quad\quad}_3 \quad \underbrace{\quad\quad\quad}_5 \quad \underbrace{\quad\quad\quad}_3$

$$t_n = An^p + Bn \xrightarrow{A = -\frac{3}{2}} -\frac{3}{2}n^p + Bn \xrightarrow[n=1]{t_1=4} -\frac{3}{2} + B = 4 \Rightarrow \boxed{B = \frac{11}{2}}$$

$$t_n = -4, -1, 0, \dots \rightarrow t_n = an^p + bn + c \rightarrow t_n = n^p + bn - 4 \xrightarrow{n=1} -4 = 1 + b - 4$$

$$\begin{array}{c} \text{+2} \\ \text{+2} \\ \text{+2} \end{array}$$

$$pa = 2 \rightarrow a = 1$$

$$c = -4$$

$$b = -1$$

$$t_n = n^p - n - 4$$

$$a_1 = a_1 + d = 1$$

$$a_4 = a_1 + 3d = 4$$

$$3d = 3 \Rightarrow d = 1$$

$$a_1 = 1$$

$$a_n = n^p - n - 4$$

$$n^p - n - 4 = n^p - 4n - 21 \Rightarrow n^p - 4n - 21 = 0 \rightarrow (n-9)(n+3) = 0 \rightarrow \begin{cases} n = 9 \\ n = -3 \end{cases}$$