

$$\begin{aligned} a_1 &= 250 \\ a_7 &= 21 \Rightarrow d = \frac{a_7 - a_1}{7-1} = \frac{21-250}{6} = \frac{-229}{6} = -\frac{229}{6} \Rightarrow d = -\frac{229}{6} \end{aligned}$$

$$a_n = vn + b \Rightarrow a_1 = v + b = 250 \Rightarrow b = 249 \Rightarrow a_n = vn + 249 \Rightarrow$$

$$a_n = vn + 249 = 201 \Rightarrow vn = 201 - 249 = -48 \Rightarrow \boxed{n = 201} \Rightarrow \boxed{a_{201} = 201}$$

$$\frac{v}{n} \Rightarrow vn + 249 \Rightarrow 999 \geq vn + 249 \geq 100 \Rightarrow 999 \geq vn \geq 91 \Rightarrow$$

$$\frac{999}{v} \geq n \geq \frac{91}{v} \Rightarrow 142 \geq n \geq 13 \dots \Rightarrow 142 \geq n \geq 13 \Rightarrow \text{تعداد} = 142 - 13 + 1 = \boxed{130}$$

$$a_n = vn + 249 \xrightarrow{+v} \xrightarrow{+v} \dots \xrightarrow{+v} 149 \Rightarrow \boxed{149} \text{ عدد اولی و آخری عدد اولی} \rightarrow a_n = vn + 249, a_n = a_1 + d \Rightarrow a_n = 101 + (n-1)v = 999$$

$$a_{k+1} + a_{n+k} + a_{n+k} = a_1 + kd + a_1 + (n+1)d + a_1 + (n+2)d \Rightarrow$$

$$3a_1 + (3n+3)d \Rightarrow 3(a_1 + (n+1)d) \Rightarrow$$

$$3(a_1 + (n+1)d) = 3(n+1) \Rightarrow a_1 + (n+1)d = -2n-2 \Rightarrow a_1 + 0 = 2+2=4 \Rightarrow a_1 = 4$$

$$\text{if } a_1 = 4 \Rightarrow (n+1)d = -2n-2 = -2(n+1) \Rightarrow (n+1)d = -2(n+1) \Rightarrow \boxed{d = -2}$$

$$a_{vv} = a_1 + 44d = 4 + (44 \times -2) = -87 \text{ و } a_{11} = 4 + 1d = 4 + (-2) = 2 \Rightarrow a_{vv} + a_{11} =$$

$$a_1 - a_{11} = a_{11} - a_{11} \Rightarrow (r^{n-1} - (r^n - 1)) = (r^{2n} - r^n) - (r^{n-1} - 1) \Rightarrow$$

$$\begin{aligned} r^{n-1} - r^n + r^{n-1} - r^n &= +1 + r = +r \Rightarrow r^{n-1} \times r + (-r^n - r^n) = +r \\ r^{n-1} + 1 &+ (-r^n)(1 - r^n) \Rightarrow r^{n-1} - r^n(1 - r^n) = r^{n-1} - r^n + r^{2n} \\ r^{n-1} &= r^n \Rightarrow (r^{n-1})^n = +r \Rightarrow r^n = +r \Rightarrow \boxed{n=1} \end{aligned}$$

$$a_{11} = r - r = 1, a_{11} = r = 1, a_{11} = r - 1 = 1 \Rightarrow a_{11} + a_{11} + a_{11} = 1 + 1 + 1 = \boxed{3}$$

$$a_{11} + a_{10} = 2d, a_{11} - a_{10} = d \Rightarrow a_{11} - a_{10} = 2d = d \Rightarrow d = \frac{d}{1}$$

$$a_{11} = a_1 + 11d, a_{10} = a_1 + 10d \Rightarrow a_{11} + a_{10} = 2a_1 + 21d = 2(a_1 + 10.5d) = 2d \Rightarrow$$

$$2(a_1 + 10.5d) = 2d \Rightarrow 2a_1 + 21d = 2d \Rightarrow 2a_1 = -19d \Rightarrow a_1 = -\frac{19d}{2} \Rightarrow$$

$$a_{11} = a_1 + 11d \Rightarrow a_{11} = -\frac{19d}{2} + 11d = -\frac{19d}{2} + \frac{22d}{2} = \frac{3d}{2} \Rightarrow \boxed{a_{11} = \frac{3d}{2}}$$

$$S_{\omega} = \text{دولت } \omega \quad S'_{\omega} = \text{دولت } \omega \quad \Rightarrow S_{\omega} = S'_{\omega} \times \frac{1}{r} \Rightarrow$$

$$S'_{\omega} = \frac{\omega}{r} (r(a_1 + r d) + r d) = \left(\frac{\omega}{r} (r a_1 + r d) + r d \right) = \frac{\omega}{r} (r a_1 + r d)$$

$$S_{\omega} = \frac{\omega}{r} (r a_1 + r d) \Rightarrow \frac{\omega}{r} (r a_1 + r d) = \frac{\omega}{r} \times \frac{1}{r} (r a_1 + r d) \Rightarrow r a_1 + r d = r a_1 + r d$$

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

$$t_n = t_n - r d + d \Rightarrow -r d + d = 0 \Rightarrow -r d = -d \Rightarrow \boxed{d = d}$$

$$t_q = t_1 + \lambda d \Rightarrow (t_1 + \lambda d)^r = t_1^r + r \lambda d + \lambda^2 d^2$$

$$t_{\omega} = t_1 + \frac{r d}{r_0} \Rightarrow (t_1 + \frac{r d}{r_0})^r = t_1^r + r \frac{r d}{r_0} + \frac{r^2 d^2}{r_0^2}$$

$$\Rightarrow r_0 + r t_1 = t_q - t_{\omega}$$

$$t_v = t_1 + \frac{r d}{r_0} = t_1 + r_0 \Rightarrow \frac{t_q - t_{\omega}}{t_v} = \frac{r_0 + r t_1}{t_1 + r_0} = \frac{r_0 (r_0 + t_1)}{(r_0 + t_1)} = \boxed{\frac{r_0}{r_0 + t_1}}$$

$$a_1 = r - 9\sqrt{r} \Rightarrow r + \sqrt{r} = (r - 9\sqrt{r}) + 11d = a_{11} \Rightarrow$$

$$a_{11} = r + \sqrt{r} \quad 11d = \sqrt{r} + 9\sqrt{r} \Rightarrow \boxed{d = \frac{\sqrt{r} + 9\sqrt{r}}{11}}$$

$$p_{11} = d = \frac{a_{11} - a_1}{11 + 1} = \frac{r + \sqrt{r} - (r - 9\sqrt{r})}{12} = \frac{\sqrt{r} + 9\sqrt{r}}{12}$$

$$d = \frac{a_{11} - a_1}{11 + 1}$$

$$r_1, \dots, r_{n-1} \Rightarrow d = \frac{r_n - r}{(n-1) + 1} = \frac{r_0}{n-1} = \frac{r_0}{r(n-1)} = \boxed{\frac{1}{r(n-1)}}$$

$$\Rightarrow a_{n+1} = 11 \Rightarrow a_n + d = 11 \Rightarrow a_{n+1} = a_1 + nd = \boxed{nd = 10} \Rightarrow d = \frac{10}{n}$$

$$d = \frac{r_n - r}{(n-1) + 1} = \frac{r_0}{n-1} \Rightarrow \frac{r_0}{n-1} = \frac{10}{n} \Rightarrow r_0 n = 10(n-1) \Rightarrow 9n = 10 \Rightarrow \boxed{n = \frac{10}{9} = 1.11}$$

$$a_n + a_{n+r} = a_r + a_{11} \Rightarrow n + (n+r) = 11 + 11 = 22 \Rightarrow r_n + r = 20 \Rightarrow$$

$$r_n = 19 \Rightarrow \boxed{n = 1}$$

$$\Rightarrow a_1 = r a_r \Rightarrow \frac{a_1}{a_r} = r \Rightarrow \frac{a_1 + r d}{a_1 + r d} = r \Rightarrow r a_1 + r d = a_1 + r d \Rightarrow r a_1 = r d \Rightarrow \boxed{a_1 = -d}$$

$$\Rightarrow \text{if } a_1 = -d \Rightarrow a_n = 0 \Rightarrow a_n = a_1 + (n-1)d = 0 \Rightarrow a_1 + n d - d = 0 \Rightarrow n d - r d = 0 \Rightarrow d(n-r) = 0 \Rightarrow d = 0 \text{ or } n = r \Rightarrow \boxed{n = r = 11} \Rightarrow a_r = 0$$

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