

سوال ۱

$$\begin{cases} t_1 = K_0 \\ t_K = 91 \end{cases} \Rightarrow \begin{cases} t_1 = K_0 \\ t_K = Kd + \frac{t_1}{K} = 91 \end{cases} \quad Kd = 21 \rightarrow d = 7$$

$$t_n = t_1 + (n-1)d \rightarrow K_0 + 7(n-1) = 201$$

$$7n - 7 = 201 - K_0 \rightarrow 7n = 191$$

$$n = 27 \checkmark$$

$$7n - 7 > 100 \rightarrow 7n > 107 \rightarrow n > 15.28 \rightarrow n \geq 16$$

$$7n - 7 < 1000 \rightarrow 7n < 1007 \rightarrow n < \frac{1007}{7} \rightarrow n < 143.85 \rightarrow n \leq 143$$

$$\Rightarrow 16 \leq n \leq 143 \quad 143 - 16 = 127 \checkmark$$

$$a_1 + nd + a_1 + (n+1)d + a_1 + (n+2)d =$$

$$3a_1 + (3n+3)d = 4n+12$$

$$3a_1 + 3nd + 3d = 4n+12$$

$$3d = -4$$

$$d = -\frac{4}{3}$$

سوال ۳

$$3a_1 + 3\left(-\frac{4}{3}\right) = 12 \rightarrow 3a_1 = 16 \rightarrow a_1 = \frac{16}{3}$$

$$a_1 + a_{14} = a_1 + 14d + a_1 + 14d = 4 + 14\left(-\frac{4}{3}\right) + 4 + 14\left(-\frac{4}{3}\right)$$

$$\Rightarrow -\frac{104}{3} \checkmark$$

$$\begin{aligned} a_{17} &= r^{17} - 1 = 17 \\ a_1 &= r^2 + 1 = 1 \\ a_{17} &= r^{17} - 1 = 17 \end{aligned}$$

$$d_{17} = a_{17} - a_1$$

$$d_{17} = a_{17} - a_1$$

$$a_{17} - a_1 = a_{17} - a_1$$

$$r^{17+1} - (r^{17} - 1) = (r^{17} - 1) - r^{17+1}$$

$$\left[r^{17+1} - r^{17+1} = r^{17} (r - 1) = r^{17} + 1 \right] = \left[r^{17} - 1 - r^{17+1} = r^{17} - r^{17+1} - 1 \right]$$

$$r^{17} + 1 = r^{17} - r^{17+1} - 1 \rightarrow r^{17} + 2 = r^{17+1} \rightarrow r^{17} = \frac{r^{17+1} - 2}{r - 1}$$

$$r^{17} + 2 = r^{17} \Rightarrow r^{17} - r^{17} - 2 = 0 \rightarrow (r - 1)(r^{17} + 1) = 0 \rightarrow r = 1$$

P4PCO

$$t_{11} - t_{10} = \omega \Rightarrow t_1 + 11d - t_1 - 9d = \omega$$

سوال 5

$$t_{11} + t_{10} = 2\omega \quad \left. \begin{array}{l} 2d = \omega \rightarrow d = \frac{1}{2}\omega \end{array} \right\}$$

$$\Rightarrow t_1 + 11d + t_1 + 9d = 2\omega$$

$$2t_1 + 20d = 2\omega \rightarrow 2t_1 + \omega = 2\omega$$

$$2t_1 = \omega \rightarrow t_1 = \frac{1}{2}\omega$$

$$t_{11} = t_1 + 20d \Rightarrow -\frac{1}{2}\omega + 20\left(\frac{1}{2}\omega\right) = \frac{19}{2}\omega \quad \checkmark$$

$$S_1 = \frac{n}{2} [2a + (n-1)d] \Rightarrow \frac{\omega}{2} [2a + 4d] = \omega a + 2\omega d \quad \text{سوال 9}$$

مجموع 1, 2, 3, 4

$$S_2 = \frac{\omega}{2} [(a + 2d) + (a + 4d)] = \frac{\omega}{2} [2a + 6d] = \omega a + 3\omega d$$

1, 2, 3, 4

$$\omega a + 2\omega d = \frac{1}{2} (\omega a + 3\omega d) \Rightarrow \omega a + 2\omega d = \frac{\omega a}{2} + \frac{3\omega d}{2}$$

$$\omega(a + 4d) = \frac{\omega}{2}(a + 6d) \rightarrow a + 4d = \frac{1}{2}a + \frac{3}{2}d$$

$$2a + 8d = a + 3d$$

$$2a - a = 3d - 8d \rightarrow a = -5d$$

$$\frac{qr}{a_1} = \frac{a+d}{a} = \frac{a+a}{a} = \frac{2a}{a} = 2 \quad \checkmark$$

$$t_n = t_{n-1} + 1\omega \rightarrow a + (n-1)d = a + (n-2)d + 1\omega \quad \text{سوال 10}$$

$$t_{n-1} = a + (n-2)d = a + (n-2)d \quad \rightarrow (n-1)d - (n-2)d = 1\omega$$

$$d(n-1 - n + 2) = 1\omega$$

$$-d = 1\omega \rightarrow d = -\omega$$

$$t_9 = a + (9-1)\omega = a + 8\omega$$

$$t_{10} = a + (10-1)\omega = a + 9\omega$$

$$\left. \begin{array}{l} t_9 - t_{10} = (t_9 - t_{10}) \\ a + 8\omega - a - 9\omega = -\omega \end{array} \right\} \quad \rightarrow \quad \frac{t_9 - t_{10}}{a + 8\omega - a - 9\omega} = \frac{-\omega}{-\omega} = 1$$

$$t_9^r - t_0^r = r_0 \times (r_a + y_0) = r_0 a + 1100$$

اطمئنان سوال ۷

$$t_v = a + 4 \times 100 \rightarrow a + 100$$

$$\frac{t_9^r - t_0^r}{t_v} = \frac{r_0 a + 1100}{a + 100} = \frac{r_0 (a + 100)}{a + 100} = r_0$$

سوال ۸ $r_0 + \sqrt{r_0}$ $r_0 = 12$ $r_0 = 12$

سوال ۹ $r_0 = 12$ $a_1 = r_0 - 12\sqrt{r_0}$ $a_{12} = r_0 + \sqrt{r_0}$

$$r_0 + \sqrt{r_0} = r_0 - 12\sqrt{r_0} + 13d$$

$$r_0 + \sqrt{r_0} - r_0 + 12\sqrt{r_0} = 13d \rightarrow 13\sqrt{r_0} = 13d \rightarrow d = \sqrt{r_0}$$

سوال ۹ $a_1 = r_0$ $a_n = r_0$ $r_0 + \epsilon_n - r_0 = \epsilon_{n-1}$ $\rightarrow (n-1) \Rightarrow n+1 = 11$

$$r_0 = r_0 + (\epsilon_n - 1)d \rightarrow r_0 = r_0 + \epsilon_n d - rd$$

$$r_0 = (\epsilon_n - r_0)d \rightarrow d = \frac{r_0}{\epsilon_n - r_0} = \frac{10}{r_n - 1}$$

$$a_{n+1} = a_1 + n \times d \rightarrow 11 - r_0 = n \times \frac{10}{r_n - 1}$$

$$9 = n \times \frac{10}{r_n - 1} \rightarrow 10n - 9 = 10n$$

$$r_n = 9 \rightarrow n = 10$$

سوال ۱۰

$$t_n + t_{n+1} = t_1 + t_{11} \rightarrow t_1 + (n-1)d + t_1 + (n-1)d = r_0 t_1 + r_0 d(n+1)$$

$$t_1 + r_0 d + t_1 + 14d = r_0 t_1 + 14d$$

$$r_0 t_1 + r_0 d(n+1) = r_0 t_1 + 14d \rightarrow (r_0 n + r_0)d = 14d \rightarrow r_0 n + r_0 = 14 \rightarrow r_0 n = 14 \rightarrow n = 1$$

$$t_n = \frac{w}{r} \left(\frac{n}{r} \right) \Rightarrow \frac{w t_n}{r} = t_n \rightarrow t_n = w t_e \quad \text{to show it}$$

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

$$r t_1 + r d = 0 \rightarrow t_1 + d = 0$$

$$d = -t_1$$

$$t_k = t_1 + (k-1)d \rightarrow t_k = d + (k-1)d = \underbrace{(k-1)}_{k-1=0} d$$

! است. پس در $k=1$ ✓