

$$a_n = \frac{1}{r}, 1, 2$$

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$$q = \frac{2}{1} = 2 \rightarrow a_n = a_1 q^{n-1} \rightarrow a_n = \frac{1}{r} (2)^{n-1}$$

$$a_{10} = ? \rightarrow a_{10} = a_1 q^9 \rightarrow a_{10} = \frac{1}{r} \times 2^9 = 2^9 = 512 \text{ (الف)}$$

$$\frac{a_{14}}{a_{12}} = \frac{a_{12} q^2}{a_{12}} = 14 \text{ (ب)}$$

$$a_{12}, \dots, a_{10} \Rightarrow b^2 = ac \text{ (ج)}$$

$$b^2 = a_{10} a_{12}$$

$$a_{12} \leftarrow a_{10} a_{12}$$

$$\downarrow a_{12} = \frac{1}{r} (2^{12}) = 2^{12} = 4096$$

$$121 = r^{n-2} \Rightarrow r^2 = r^{n-2} \Rightarrow n-2 = 2 \Rightarrow n = 4 \text{ (د)}$$

$$\frac{a_n}{a_2} = \frac{94}{12} \rightarrow \frac{a_2 q^2}{a_2} \Rightarrow q^2 = 12 \Rightarrow q = \sqrt{12} \text{ (ه)}$$

$$a_{10} = a_1 q^9 \rightarrow a_{10} = 94 \times 2 = 188$$

$$a_1 \times a_2 \times a_3 \times a_4 \times a_5 = 243$$

$$a_1 q^0 \times a_2 q^1 \times a_3 q^2 \times a_4 q^3 \times a_5 q^4 = 243$$

$$a_5 = 243 \rightarrow a_5 = 3$$

$$a_1 \times a_5 = a_3 q^2 \times a_3 q^2 = a_3^2 = 9 \text{ (و)}$$

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$$r^a, r^{\sqrt{r}}, r^b$$

$$b^r = ac \Rightarrow (r^{\sqrt{r}})^r = r^a \times r^b \rightarrow r^r = r^{a+b} \rightarrow r^a = r^{a+b}$$

$$a = a+b$$

$$360, 21, = \frac{a+b}{r} = \frac{a}{r} = r, a$$

$$a_r = 1-n$$

$$a_r = n$$

$$a_{n+1} = n+1$$

$$\left. \begin{array}{l} a_r = 1-n \\ a_r = n \\ a_{n+1} = n+1 \end{array} \right\} \rightarrow \begin{array}{l} n^r = (n+1)(1-n) \\ n^r = 1-n^r \\ r n^r = 1 \end{array} \rightarrow n^r = \frac{1}{r} \rightarrow n = \pm \frac{\sqrt{r}}{r}$$

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فقط $\frac{\sqrt{r}}{r}$ درست است!

$$a_1 + a_r = r1 \rightarrow a_1 + a_1 q^r = r1 \rightarrow a_1(1+q^r) = r1 \quad (4)$$

$$a_r + a_r = r2 \rightarrow a_1 q + a_1 q^r = r2 \rightarrow a_1 q(1+q) = r2$$

$$\Rightarrow a_1 = \frac{r2}{q(1+q)}$$

$$a_1(1+q^r) \xrightarrow{\text{if } a_1 = \frac{r2}{q(1+q)}} \frac{r2}{q(1+q)} \times (1+q^r) = r1$$

$$\Rightarrow r2(1+q^r) = r1q(1+q)$$

$$r2 + r2q^r = r1q + r1q^r \rightarrow r2q^r - r1q^r - r1q + r2 = 0$$

$$r(3q^3 - 2q^2 - 2q + 3) = 0 \quad \text{این سه جایی که باید از آنجا عبور کنیم به نظر می آید}$$

$$r(3(21) - 2(9) - 2(3) + 3) = r(63 - 18 - 6 + 3) = r(42) = 0$$

$$\text{Hashtag} \Rightarrow q=3 \rightarrow a_1 = \frac{r2}{q(1+q)} \Rightarrow a_1 = \frac{r2}{12} = 1$$

$$\sqrt{12} \rightarrow 1, 3, 9, 27 \Rightarrow 27$$

$$a + aq + aq^2 = 1^3 \rightarrow a(1 + q + q^2) = 1^3 \quad (*)$$

$$a \times aq \times aq^2 = a^3 q^3 = 2^3 \rightarrow (aq)^3 = 2^3 \Rightarrow \underline{aq = 2}$$

$$* \text{ قیاب } \rightarrow \frac{aq}{q} (1 + q + q^2) = 1^3$$

$$\frac{1^3}{q} (1 + q + q^2) = 1^3$$

$$1^3 (1 + q + q^2) = 1^3 q \rightarrow 1 + q + q^2 = 1q$$

$$1q^2 - 10q + 1 = 0$$

$$q^2 - 10q + 9 = 0$$

$$(q - 9)(q - 1) = 0$$

$$\rightarrow q = \frac{9}{1} = 9$$

$$\rightarrow q = \frac{1}{9}$$

$$① \text{ if } q = 9 \rightarrow aq = 2 \rightarrow \frac{aq}{q} = \frac{2}{9} \Rightarrow \underline{a = \frac{2}{9}}$$

$$② \text{ if } q = \frac{1}{9} \rightarrow a = \frac{2}{\frac{1}{9}} = 18$$



$$① \rightarrow \text{نسبت: } 1, 9, 81$$

$$② \rightarrow \text{نسبت: } 18, 2, \frac{1}{18}$$

$$a_n = 1, 9, 81, \dots \rightarrow a_n = 1(9)^{n-1} \rightarrow a_{10} = 1(9)^9 \quad (1)$$

$$q = 9 \quad a_1 = 1 \rightarrow S_n = a_1 \left(\frac{q^n - 1}{q - 1} \right) \quad (2)$$

$$\Rightarrow S_{10} = 1 \left(\frac{9^{10} - 1}{9 - 1} \right) = 51031040$$

$$P_n = \sqrt[n]{(a_1 a_n)^n} \Rightarrow P_{10} = \sqrt[10]{(a_1 a_{10})^{10}}$$

$$= \sqrt[10]{(1 \times 1 \times 9^9)^{10}} = (1 \times 1 \times 9^9)^{10/10} = 1 \times 1 \times 9^9$$

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$$a, aq, aq^2, aq^3, \dots$$

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$$\begin{aligned} & \underbrace{aq - a}, \underbrace{aq^2 - aq}, \underbrace{aq^3 - aq^2}, \dots \\ & \downarrow \quad \quad \downarrow \quad \quad \downarrow \\ & a(q-1), aq(q-1), aq^2(q-1), \dots \end{aligned}$$

هر جمله نسبت به جمله قبل ضرب در q دارد
 $\Rightarrow$ دنباله هندسی است با قدر نسبت q

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$$\begin{cases} S_n = a_1 + (a_1 + d) + (a_1 + 2d) + \dots + (a_n - d) + a_n \\ S_n = a_n + (a_n - d) + (a_n - 2d) + \dots + (a_1 + d) + a_1 \end{cases} \quad (\text{الف})$$

$$2S_n = \underbrace{(a_n + a_1) + (a_n + a_1) + (a_n + a_1) + \dots + (a_1 + a_n)}_{(a_n + a_1) \times n}$$

$$2S_n = n(a_n + a_1) \Rightarrow S_n = \frac{n}{2}(a_n + a_1)$$

$$S_n = \frac{n}{2}(a_1 + (n-1)d + a_1) \Rightarrow S_n = \frac{n}{2}(2a_1 + (n-1)d)$$

$$S_n = a + aq + aq^2 + \dots + aq^{n-1} \quad (\text{ب})$$

$$-qS_n = -aq - aq^2 + \dots - aq^{n-1} - aq^n$$

$$S_n - qS_n = a + 0 + 0 + \dots - aq^n$$

$$\text{Hashtag} \quad S_n(1-q) = a - aq^n \rightarrow S_n = \frac{a - aq^n}{1-q}$$

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$$S_n = a_1 \left(\frac{1-q^n}{1-q} \right)$$