

سوال ۱)

$$a_n = \frac{1}{r}, \frac{1}{r^2}, \frac{1}{r^3}, \dots$$

$$q = r, a_1 = \frac{1}{r}$$

جواب: ۱۹۱۷۵۵

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$$1111 = r^2 \Rightarrow a_1 \times q^{n-1}$$

$$\frac{1}{r} \times r^{n-1}$$

$$n-1 = 1 \Rightarrow n = 2$$

الف) $a_{10} \Rightarrow \frac{1}{r} \cdot (r)^9 = \frac{1}{r} \cdot r^9 = \frac{r^8}{r} = r^7 = 256$

ب) $\frac{a_{14}}{a_{12}} \rightarrow \frac{aq^{14}}{aq^{12}} \rightarrow \frac{r^{14}}{r^{12}} \rightarrow r^2 = 16$

ج) $a_4 = aq^3 = \frac{1}{r} \times r^3 = r$ / $a_{10} \rightarrow aq^9 \rightarrow \frac{1}{r} \times r^9 = 256$

$$b^2 = a \cdot c$$

$$b^2 = 256 \times r = b^2 = \frac{1 \cdot 256}{1 \cdot 256}$$

$b = \pm 16$

یعنی می‌تواند ۱۶ یا -۱۶ باشد

سوال ۲)

$$a_5 = 12, q^3 \rightarrow q^3 = 1 \Rightarrow q = 1$$

$a_1 = 96$

$a_{10} = ? \Rightarrow a_1 q^9 \Rightarrow 96 \times 1 = 96$

سوال ۳)

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

$$\frac{a}{q^4} \times \frac{a}{q^3} \times a \times aq \times aq^2 = a^5 = 243$$

$$a = 3$$

ب) $a_1 \times a_5 = 9$

$$\frac{a}{q^4} \times aq^4 = a^2 = 9 \Rightarrow a = 3$$

سوال ۴)

$$r^a, r^b \Rightarrow b^2 = ac \Rightarrow (r^b)^2 = r^a \cdot r^b \Rightarrow r^{2b} = r^{a+b}$$

$$a+b = 5$$

واصله

$$b = \frac{a+c}{2} = \frac{5}{2} = 2.5$$

سوال ۵)

$$ar = 1 - n$$

$$a_1 = n \rightarrow ar^1 = n \Rightarrow 1 - n = n \Rightarrow 1 = 2n \Rightarrow n = \frac{1}{2}$$

$$a_4 = n+1 \rightarrow ar^4 = n+1 \Rightarrow 1 - n^4 = n+1$$

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درست! $n = \pm \sqrt{\frac{1}{2}}$

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6 (سوال) $a_1 + a_2 = 21 \rightarrow a + aq^2 = 21 \rightarrow a(1+q^2) = 21$
 $a_2 + a_3 = 12 \rightarrow aq + aq^3 = 12 \rightarrow a(1+q) = 12$ $\rightarrow \frac{a(1+q^2)}{a(1+q)} = \frac{21}{12}$

$\frac{(1+q)(1-q+q^2)}{q(1+q)} = \frac{7}{4} \Rightarrow 1-q+q^2 = \frac{7}{4}q \Rightarrow q^2 - 1.75q + 1 = 0 \Rightarrow \Delta = 1.5625 - 4 = -2.4375$

$q = \frac{1.75 \pm \sqrt{-2.4375}}{2} \Rightarrow \frac{1.75 \pm 1.5625i}{2}$
 $q(1+q^2) = 21 \Rightarrow q = 3 \Rightarrow q = 1$
 $6a = \frac{1}{4} \Rightarrow a = \frac{1}{24}$

درست است $\rightarrow 6, 9, 12$
 صحیح است $\rightarrow 12, 9, 6$ $\rightarrow$ درست است $\Rightarrow (27)$

7 (سوال) $a_1 + a_2 + a_3 = 13 \Rightarrow \frac{a}{q} + a + aq = 13 \rightarrow 1 + q + q^2 = 13 \Rightarrow q^2 + q - 12 = 0$
 $\Delta = b^2 - 4ac = 1 - 48 = -47$
 $100 - 47 = 53$
 $a = \frac{1.5 \pm \sqrt{53}}{2} \rightarrow \frac{1}{4}$
 $a_1, a_2, a_3 \rightarrow q^2, 1$
 $\frac{a}{q} = a, aq \rightarrow 1, 3, 9$

8 (سوال) $a_1 = 2, 9, 18, 11, 2 \rightarrow q = 3$
 الف) $S_{10} = \frac{2(3^{10} - 1)}{3 - 1} = 29, 181$
 ب) $P = (2 \times 3 \times 9 \times 18 \times 11 \times 2)^{10} = (78 \times 11 \times 2)^{10}$
 $aq^9 = 2 \times 3^9 = 3 \times 9 \times 18 \times 11 \times 2$

9 (سوال) $a, aq, aq^2 \rightarrow aq^3 - aq^2$
 $a(q-1) \leftarrow aq^3 - a \rightarrow a^2q - aq \rightarrow aq^2(q-1)$

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

$S = a \left(\frac{q^n - 1}{q - 1} \right) \rightarrow (S_n = a + aq + \dots + aq^{n-1}) \times q = aq + aq^2 + \dots + aq^n$
 $qS_n - S_n = aq^n - a \rightarrow S_n(q-1) = a(q^n - 1) \Rightarrow S_n = \left(\frac{q^n - 1}{q - 1} \right)$