

سوال ۱)

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

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

جواب:

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$$111 = 2^2 \Rightarrow a_1 \times q^{n-1}$$

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

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

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)  $a_4 = aq^3 = \frac{1}{r} \times r^3 = r^2$  /  $a_{10} \rightarrow aq^9 \rightarrow \frac{1}{r} \times r^9 = r^8 = 256$

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

$$b^2 = 256 \times r^2 = b^2$$

$$\frac{1 \cdot 256}{1 \cdot 256}$$

ب = ± 16

سوال ۲)

$$\begin{cases} a_5 = 12 \\ a_8 = 96 \end{cases} \rightarrow q^3 \rightarrow q^3 = 8 \Rightarrow q = 2$$

$$a_{10} = ? \Rightarrow a_1 q^9 \Rightarrow 96 \times 4 = 384$$

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)  $a_1 \times a_5 = 9$

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

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)

$$a_2 = 1 - n$$

$$a_7 = n \rightarrow a_2 \times q^5 = n \Rightarrow (1-n)q^5 = n \Rightarrow q^5 = \frac{n}{1-n} = \frac{n+1}{n}$$

$$a_4 = n+1 \rightarrow a_7 = a_4 \times q^3 \Rightarrow nq^3 = n+1 \Rightarrow q^3 = \frac{n+1}{n}$$

$$n = \pm \sqrt{\frac{r}{r}}$$

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$$a_1^2 = 1 - a_1^2 \Rightarrow a_1^2 = 1 - a_1^2$$

$$2a_1^2 = 1$$

$$a_1^2 = \frac{1}{2}$$

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

$\frac{(1+q)(1+q^2)}{q(1+q)} = \frac{7}{4} \Rightarrow 1+q+q^2 = 7q \Rightarrow q^2 - 6q + 1 = 0$   
 $\Delta = 36 - 4 = 32$

$q = \frac{6 \pm \sqrt{32}}{2} = \frac{6 \pm 4\sqrt{2}}{2} = 3 \pm 2\sqrt{2}$   
 $q = 3 + 2\sqrt{2} \rightarrow a = \frac{12}{1+q} = \frac{12}{4+2\sqrt{2}} = \frac{6}{2+\sqrt{2}} = \frac{6(2-\sqrt{2})}{2} = 6-3\sqrt{2}$   
 $q = 3 - 2\sqrt{2} \rightarrow a = \frac{12}{1+q} = \frac{12}{4-2\sqrt{2}} = \frac{6}{2-\sqrt{2}} = \frac{6(2+\sqrt{2})}{2} = 6+3\sqrt{2}$

$a_1, a_2, a_3 \rightarrow 6-3\sqrt{2}, 6-3\sqrt{2}q, 6-3\sqrt{2}q^2$   
 $a_1, a_2, a_3 \rightarrow 6+3\sqrt{2}, 6+3\sqrt{2}q, 6+3\sqrt{2}q^2$

(سوال 7)  $a_1 + a_2 + a_3 = 13 \rightarrow \frac{a}{q} + a + aq = 13 \rightarrow a(\frac{1}{q} + 1 + q) = 13$   
 $\Delta = b^2 - 4ac = 1 - 4 = -3$   
 $a = \frac{1 \pm \sqrt{-3}}{2} = \frac{1 \pm i\sqrt{3}}{2}$   
 $\frac{a}{q} = a, aq \rightarrow 1, 3, 9$

(سوال 8)  $a_1 = 2, 9, 18, \dots \rightarrow q = 3$   
 الف)  $S_{10} = \frac{2(3^{10} - 1)}{3 - 1} = 29, 698$

ب)  $P = (2 \times 3^9 \times 3^9) = (78732) \times 3^9$

$aq^9 = 2 \times 3^9 = 39366$

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

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

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

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

$qS_n - S_n = aq^n - a \rightarrow S_n(q-1) = a(q^n - 1) \Rightarrow S_n = \frac{a(q^n - 1)}{q - 1}$