Nishant Jindal

①8

$\frac{a}{r}, a, ar$

$a^3 = 216$

$a = 6$

Sum of Prod of them in Pair

$\frac{a^2}{r} + a^2 r + a^2 = 156$

$a^2\left(\frac{1}{r} + r + 1\right) = 156$

$\cancel{a^2}^{\cancel{36}\;\cancel{6}\;3}\left(\frac{1+r+r^2}{r}\right) = \cancel{156}^{\cancel{26}\;13}$

$\frac{1+r+r^2}{r} = \frac{13}{3}$

$3r^2 + 3r + 3 = 13r$

$3r^2 - 10r + 3 = 0$

$r = 3, \frac{1}{3}$

Q9

$T_p = AR^{p-1} = a$

$T_q = AR^{q-1} = b$

$T_r = AR^{r-1} = c$

Demand $= a^{q-r}(b)^{r-p}(c)^{p-q}$

$= (AR^{p-1})^{q-r}(A \cdot R^{q-1})^{r-p} \cdot (AR^{r-1})^{p-q}$

$= A^{\cancel{q-r+r-p+p-q}} \cdot R^{(p-1)(q-r)+(q-1)(r-p)+(r-1)(p-q)}$

$= 1$

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10) Copy → Check.

11) Roko.

12) $2x^3-19x^2+57x-54=0 <$ $\frac{a}{r}$, a, ar

Copy

Prod $= \frac{54}{2} = 27 = a^3$

$\boxed{a=3} = \beta = x$

$(x-3)(\quad)(\quad) = 0$

Q 13 → $a-d, a, a+d = 21$

$a = 7$

$7-d, 7, 7+d$

$7-d, 6, 8+d \rightarrow GP \Rightarrow$ $6^2 = (7-d)(8+d) = 56-d-d^2$

$\Rightarrow d^2+d-20=0 \Rightarrow (d+5)(d-4)=0$

$d = 4, -5$

Q 14. $\frac{a}{1-r} = 4$,

$a^3, a^3r^3, a^3r^6, a^3r^9 \ldots$

$\frac{a^3}{(1-r)^3} = 64$

$$\frac{\frac{a^3}{1-r^3}}{\frac{a^3}{(1-r)^3}} = \frac{192}{64}$$

$$\frac{(1-r)^{\cancel{3}2}}{(\cancel{1-r})(1+r+r^2)} = \frac{\cancel{192}}{\cancel{64}}3$$

$1-2r+r^2 = 3+3r+3r^2$

$2r^2+5r+2=0$

$2r^2+4r+r+2=0$

$(2r+1)(r+2)=0$

$r=-2, r=-1/2$

15) (ii) $1+\frac{3}{4}+\frac{7}{16}+\frac{15}{64}+\frac{31}{256}+\cdots$

$$\underline{2^{k-1}}+\frac{2^2-1}{4}+\frac{2^3-1}{16}+\frac{2^4-1}{64}+\frac{2^5-1}{256}+\cdots\infty$$

$$1+\left\{\left(\frac{\cancel{2^2}}{\cancel{4}}+\frac{\cancel{2^3}}{\cancel{16}}+\frac{\cancel{2^4}}{\cancel{64}}+\frac{\cancel{2^5}}{\cancel{256}}\cdots\right)-\left(\frac{1}{4}+\frac{1}{16}+\frac{1}{64}+\frac{1}{256}+\cdots\infty\right)\right\}$$

$$1+\left\{\left(1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\cdots\right)-\left(\frac{1}{4}+\frac{1}{4^2}+\frac{1}{4^3}+\cdots\infty\right)\right\}$$

$$1+\left\{\frac{1}{1-1/2}-\left(\frac{1}{4-1}\right)\right\}$$

$$1+\left\{2-\frac{1}{3}\right\}=1+\frac{5}{3}=\frac{8}{3}$$

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$$S_{10}=\cancel{5}(2a+9d)=\overset{31}{\cancel{155}}$$

$$\downarrow$$

$$2a+9A=31$$

$$\boxed{A}^{=d}+Aa=9$$

$$A(1+a)=9$$

$$A=\frac{9}{1+a}$$

$$2a+\frac{9\times9}{1+a}=31$$

$$2a+2a^2+81=31+31a$$

$$2a^2-29a+50=0$$

$$2a^2-25a-4a+50=0$$

$$a(2a-25)-2(2a-25)=0$$

$$(2a-25)(a-2)=0$$

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$$\underbrace{a,\overbrace{b,c,d}^{AC}}_{GP}$$

$b^2=ac$ & $b+d=2c$

Q3

$$\underbrace{a,\overbrace{b,b+6}}_{GP}\overbrace{,\ b+12}^{AP}$$

$$b^2=a(b+6)$$

$$b^2=(b+12)(b+6)$$

$$\cancel{b^2}=\cancel{b^2}+18b+72$$

$$b=-4$$

② $a=b+12$

$$\overbrace{8,-4,2}^{gp},\ 8$$

$$8,\underbrace{-4,2,8}_{AP}$$

32 = $11+103+1005+---$

$10+1+100+3+1000+5+--$

$$\Big(\underbrace{10+10^2+10^3--}_{nterm}\Big)+\Big(\underbrace{1+3+5---}_{nterm}\Big)$$

$$10\cdot\frac{(10^n-1)}{9}+n^2$$

33) $S=\frac{1}{3}+\frac{5}{9}+\frac{19}{27}+\frac{65}{81}+----$

$$=\frac{3^1-2^1}{3}+\frac{3^2-2^2}{9}+\frac{3^3-2^3}{27}+\frac{3^4-2^4}{81}+---$$

$$=\left(\frac{3}{3}+\frac{3^2}{9}+\frac{3^3}{27}+\frac{3^4}{84}---\right)-\left(\frac{2}{3}+\frac{2^2}{9}+\frac{2^3}{27}+\frac{2^4}{81}+\sim\right)$$

$$=\Big(\underbrace{1+1+1+\sim}_{n\text{ बार}}\Big)-\left(\frac{2}{3}+\left(\frac{2}{3}\right)^2+\left(\frac{2}{3}\right)^3+\left(\frac{2}{3}\right)^4+\sim\right)$$

$$n-\frac{\frac{2}{3}\left(1-\left(\frac{2}{3}\right)^n\right)}{1-\frac{2}{3}}=n-2\left(1-\left(\frac{2}{3}\right)^n\right)$$

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$$S = \frac{2}{3} + \frac{8}{9} + \frac{26}{27} + \frac{80}{81} + \cdots$$

$$= \left(1-\frac{1}{3}\right) + \left(1-\frac{1}{9}\right) + \left(1-\frac{1}{27}\right) + \left(1-\frac{1}{81}\right) + \cdots \; n\,r$$

$$= \underbrace{(1+1+\cdots\cdots)} - \left(\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \cdots\cdots\right)$$

$$= n - \frac{\frac{1}{3}\left(1-\left(\frac{1}{3}\right)^n\right)}{2/3}$$

$$= n - \frac{1}{2}\left(1-\left(\frac{1}{3}\right)^n\right)$$

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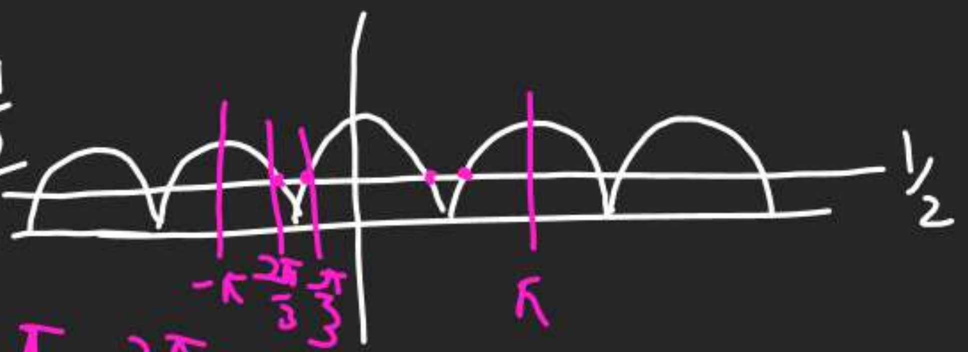
$$8^{1+|\cos x|+|\cos x|^2+|\cos x|^3+\cdots\infty} = 4^3 = 64$$

$$8^{\frac{1}{1-|\cos x|}} = 8^2$$

$$\frac{1}{1-|\cos x|} = 2$$

$$\frac{1}{2} = 1-|\cos x|$$

$$|\cos x| = \frac{1}{2}$$



$$x = -\frac{\pi}{3}, -\frac{2\pi}{3}, \frac{\pi}{3}, \frac{2\pi}{3}.$$

A.M & G.M.

Arithmatic Mean

1) One $\overset{A}{\boxed{AM}}$ betⁿ a&b.

Let AM betⁿ a, b is A

$a, A, b \to AP$

$$\boxed{A = \frac{a+b}{2}}$$

(2) n AM betⁿ a&b

$$\underset{T_1}{a}, \underbrace{\underset{T_2}{A_1}, \underset{T_3}{A_2}, \underset{T_4}{A_3} -- \underset{T_{n+1}}{A_n}}_{n\,AM}, \underset{T_{n+2}}{b} \to AP$$

$b = T_{n+2} = a + (n+2-1)d.$

$= a + (n+1)d.$

$$\boxed{d = \frac{b-a}{n+1}}$$

3^{rd} AM $= A_3 = a + 3d = a + 3\left(\frac{b-a}{n+1}\right)$

11^{th} AM $= A_{11} = a + 11d$

7^{th} AM $= A_7 = a + 7d$

(3) Sum of n AM.

$a + A_1 + A_2 + A_3 + -- + A_n + b$

$= \boxed{\frac{n}{2}(a+b)} = n\left(\frac{a+b}{2}\right)$

$= \boxed{nA}$

(4) AM of Random No

a, b, c, d, e, f find AM.

$$\frac{a+b+c+d+e+f}{6}.$$

Q If there are 11 AM betn 28 & 10 find 8th AM?

$n = 11$

$28, A_1\ A_2\ A_3 - - - A_{11}, 10$

$$d = \frac{b-a}{n+1} = \frac{10-28}{11+1} = \frac{-18}{12} = -\frac{3}{2}$$

Demand 8th AM $= A_8 = 28 + 8d$

$$= 28 + \overset{4}{\cancel{8}} \times -\frac{3}{\cancel{2}}$$

$$= 28 - 12$$

$$= 16$$

Q

Geometric Mean (G.M)

1) $\boxed{\text{One GM}} \to G.$ bet^n a & b.

let G is GM bet^n a, b.

$a, G, b \to GP$

$G^2 = a \cdot b.$

$G = \sqrt{ab}.$

(2) n G.M bet^n a & b.

$$\begin{matrix} a, & G_1, & G_2, & G_3 - & - G_n, & b \to GP \\ \downarrow & \downarrow & \downarrow & & \downarrow & \downarrow \\ T_1 & T_2 & T_3 & & T_{n+1} & T_{n+2} \end{matrix}$$

$T_{n+2} = a(r)^{n+2-1} = b$

$(r)^{n+1} = \frac{b}{a} \Rightarrow \boxed{r = \left(\frac{b}{a}\right)^{\frac{1}{n+1}}}$

8^{th} $GM = G_8 = T_9 = a \cdot r^8$

$= a \cdot \left(\frac{b}{a}\right)^{\frac{8}{n+1}}$

13^{th} $GM = G_{13} = a r^{13}$

(3) Product of n G.M.

$a \cdot G_1 \cdot G_2 \cdot G_3 \cdot G_4 - - \cdot G_n b \to GP$

$\longleftrightarrow$

$\frac{n}{2}$ Pairs

$= (ab)^{\frac{n}{2}}$

(4) Random No's GM

GM of a, b $= (ab)^{1/2}$

GM of a, b, c $= (abc)^{1/3}$

GM of a, b, c, d $= (abcd)^{1/4}$ - -

GM of

$(a_1, a_2, a_3 - - a_n) = (a_1 \cdot a_2 \cdot a_3 - a_n)^{1/n}$

Q Insert 4 GM betn 3 & 3072

$$n=4$$

$$\underline{3}, G_1\ G_2\ G_3\ G_4, \underline{3072}$$

$$r=\left(\frac{b}{a}\right)^{\frac{1}{n+1}}$$

$$r=\left(\frac{\overset{1024}{\cancel{3072}}}{\cancel{3}}\right)^{\frac{1}{5}}=\left(2^{10}\right)^{\frac{1}{5}}=2^{2}=4$$

$$G_1=T_2=ar=3\cdot 4$$

$$G_2=T_3=ar^2=3\cdot 4^2$$

$$G_3=T_4=ar^3=3\cdot 4^3$$

$$G_4=T_5=ar^4=3\cdot 4^4$$

Q find GM of 2, 5, 10, $\frac{1}{4}$, 125

$$G=\left(\cancel{2}\times 5\times \overset{5}{\cancel{10}}\times \frac{1}{\cancel{4}_{2}}\times 125\right)^{\frac{1}{5}}$$

$$\left(5^{8}\right)^{\frac{1}{8}}=5$$

Q If A_1, A_2 be 2 AM betn a & b.

G_1, G_2 be 2 GM betn a & b

find $\frac{A_1+A_2}{G_1 \cdot G_2}=?$ $\longrightarrow$ $\frac{a+b}{ab}$ Ans

$$\underbrace{a, \underbrace{A_1\ A_2}, b}_{A_1+A_2=a+b}\rightarrow AP, \qquad \underbrace{a, \overset{\frown}{G_1\ G_2}, b}_{G_1\cdot G_2=a\cdot b}\rightarrow GP$$