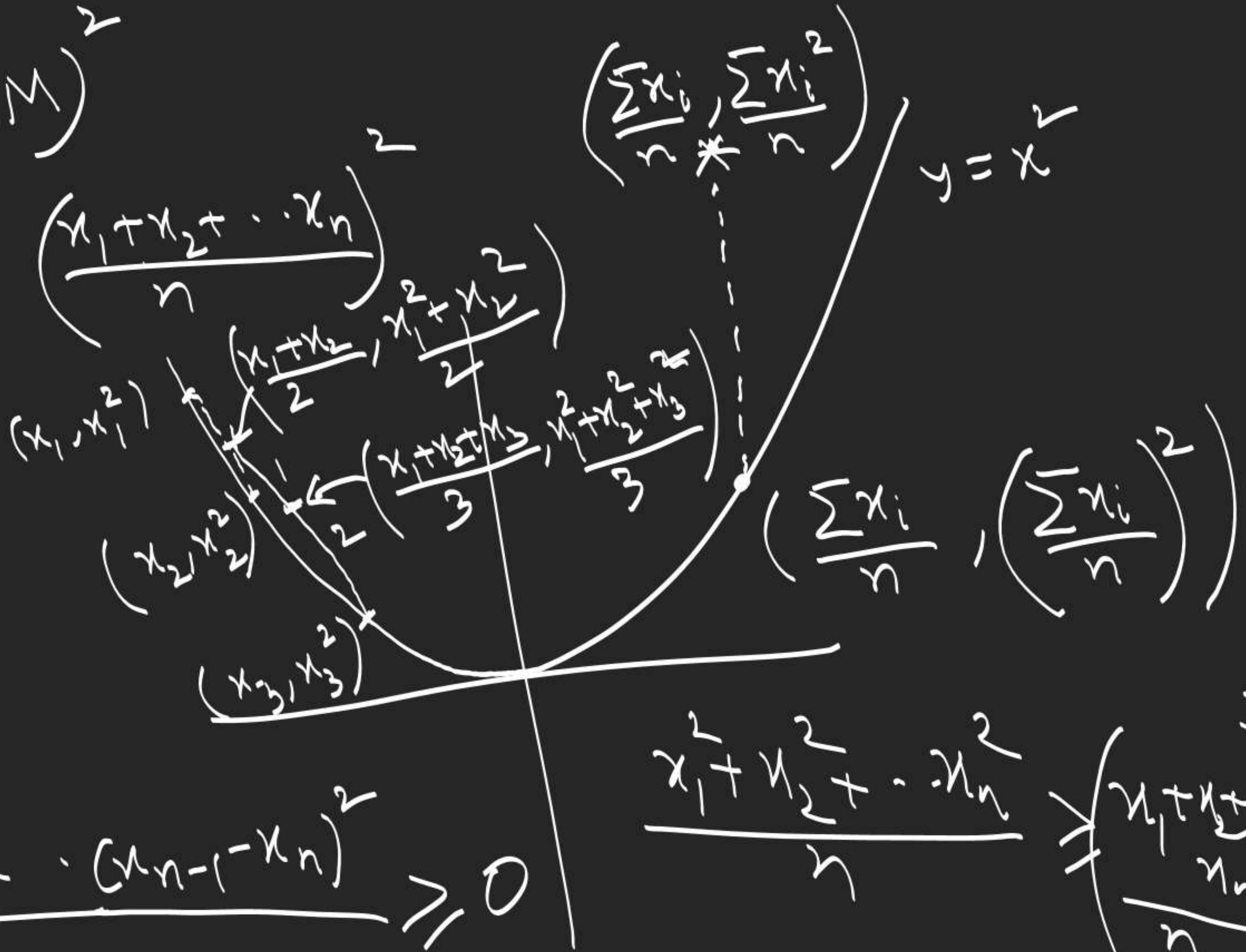
Nishant Jindal

$$(RMS)^2 \geq (AM)^2$$

$$\frac{x_1^2+x_2^2+\dots+x_n^2}{n} \geq \left(\frac{x_1+x_2+\dots x_n}{n}\right)^2$$



$$(RMS)^2-(AM)^2$$

$$= \frac{(n-1)\sum x_1^2 - 2\sum x_1 x_2}{n^2}$$

$$= \frac{(x_1-x_2)^2+(x_1-x_3)^2+\dots(x_{n-1}-x_n)^2}{n^2} \geq 0$$

$$\frac{x_1^2+x_2^2+\dots x_n^2}{n} \geq \left(\frac{x_1+x_2+\dots x_n}{n}\right)^2$$

Nishant Jindal

Relation between AM, G.M., HM of 2 no's.

$G^2 = AH$

a, b

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

$$ab = G^2$$

$$\frac{2ab}{a+b} = H = \frac{G^2}{A}$$

$$\boxed{G^2 = AH}$$

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$$2^{n+1}\underline{\sum_{k=1}^{n} k\, 2^{-k}}$$

$$S = \frac{1}{2} + \frac{2}{2^2} + \frac{3}{2^3} + \cdots \frac{n}{2^n}$$

$$\frac{1}{2}S = \frac{1}{2^2} + \frac{2}{2^3} + \cdots + \frac{n-1}{2^n} + \frac{n}{2^{n+1}}$$

$$\frac{S}{2} = \underbrace{\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \cdots + \frac{1}{2^n}} - \frac{n}{2^{n+1}}$$

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

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

$$= 2 - \frac{2}{2^n} - \frac{n}{2^n}$$

$$2^{n+2} - (n+2)2$$

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

$$\frac{n+1}{8} = 1 \Rightarrow \boxed{n = 7}$$