

NCERT DISCRETE 11.9.2.15

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Question: if $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is A.M between a and b, then find value of n.

Solution: As A.M between any two numbers a and b is average of those numbers.

let a,b are terms in A.P x(N),So

$x(0)=a$, $x(2)=b$ and $x(1)=A.M.$

$$\frac{x(0)^n + x(2)^n}{x(0)^{n-1} + x(2)^{n-1}} = \frac{x(0) + x(2)}{2} \quad (1)$$

$$2(x(0)^n + x(2)^n) = x(0)^n + x(2)^n + x(2).x(0)^{n-1} + x(0).x(2)^{n-1} \quad (2)$$

$$x(0)^n + x(2)^n = x(2).x(0)^{n-1} + x(0).x(2)^{n-1} \quad (3)$$

$$x(0)^{n-1}.(x(0) - x(2)) = x(2)^{n-1}(x(0) - x(2)) \quad (4)$$

For $x(0) \neq x(2)$

$$x(0)^{n-1} = x(2)^{n-1}$$

$$\Rightarrow n=1.$$

For $x(0)=x(2)$

$$\Rightarrow n \in \mathbb{R} \text{ i.e } n \text{ is a real value.}$$

Relation between x(0) and x(2)	Values of n
$x(0)=x(2)$	$n \in \mathbb{R}$
$x(0) \neq x(2)$	$n=1$

TABLE I
SOLUTION