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

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

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

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

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

For $x(0) \neq x(2)$
$x(0)^{n-1}$=$x(2)^{n-1}$
$\Rightarrow$ n=1.
For $x(0) = x(2)$
$\Rightarrow n \in$ R i.e n is a real value.

Columns	Parameters	Values	Description
1	$x(0)$=$x(2)$	$n \in$R	As $x(0) = x(2)$ n can be any real number
2	$x(0)\neq x(2)$	$n = 1$	As $x(0) \neq x(2)$ n equals 1 to get A.M

TABLE I
SOLUTION