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.

$$\frac{a^n + b^n}{a^{n-1} + b^{n-1}} = \frac{a+b}{2} \tag{1}$$

$$2(a^n + b^n) = a^n + b^n + b.a^{n-1} + a.b^{n-1} \tag{2}$$

$$a^n + b^n = b.a^{n-1} + a.b^{n-1} \tag{3}$$

$$a^{n-1}.(a-b) = b^{n-1}(a-b) \tag{4}$$

For a ≠ b
$a^{n-1}=b^{n-1}$
⇒ n=1.
For a=b
⇒ n∈ R i.e n is a real value.

Relation between a and b	Values of n
a=b	n∈ R
a≠ b	n=1

TABLE I
SOLUTION