

### Conditions

prove that  $1+3+9+27+\dots+3^{(n-1)}=1/2(3^n-1)$

### Solution

This is a geometric progression with  $q=3$ ,  $b_1=1$ ,  $b_n=3^{(n-1)}$

As it known, the sum of a finite geometric progression  $b_1, \dots, b_n$  is:

$$S_n = \frac{b_1(1 - q^n)}{(1 - q)}$$

So, for our case:

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

Q.E.D.