

Precalculus
Lesson 12.4: Mathematical Induction
Mrs. Snow, Instructor

Mathematical induction is a method for proving that statements involving natural numbers are true for all natural numbers.

The Principle of Mathematical Induction

Suppose that the following two conditions are satisfied with regard to a statement about natural numbers:

CONDITION I: The statement is true for the natural number 1.

CONDITION II: If the statement is true for some natural number k , it is also true for the next natural number $k + 1$.

Then the statement is true for all natural numbers.

translation:

#1 show statement is true for $n=1$

#2 assume statement is true for $n=k$,

now show statement is true for $n=k+1 \therefore$ true for all numbers

Show that the following statement is true for all natural numbers n .

$$1 + 3 + 5 + \cdots + (2n - 1) = n^2$$

Show that the following statement is true for all natural numbers n .

$$1 + 2 + 3 + \dots + n = \frac{n(n + 1)}{2}$$

Show that the following statement is true for all natural numbers n .

$$1 + 4 + 7 + \dots + (3n - 2) = \frac{1}{2}n(3n - 1)$$