**Chapter 5**

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## ­­5.1 Mathematical Induction

Mathematical Induction is used to prove statements that assert is true for all positive integers , where is a propositional function.

In order to do this, we first prove that is true. Next, we assume that the statement is true for some value , and then show that it is true for , based on this assumption.

If , show that

L.H.S. R.H.S.

Supposes, is true for .

- (i)

If is true, then for ,

Adding to both sides of equation (i),

If , show that

## 5.4 Recursive Algorithms

A recursive algorithm solves a problem by reducing it to an instance of the same problem, with a smaller input.

Give a recursive definition for computing the GCD of 2 non-negative numbers and where .

Say and

Thus, we keep setting the value of to be and the value of to be until .

procedure gcd(, : non-negative integers with )

if return

else return gcd(, )

{output is gcd (, )}

Give a recursive definition for where is non-negative.

procedure factorial ( non-negative integer)

if return

else return factorial ()

{output is }