

MATHS 255 Class Notes
Chapter 6 Induction

Axiom of Induction:

If S is a subset of \mathbf{N} satisfying

1. $1 \in S$,
2. $\forall k \in \mathbf{N}, k \in S \Rightarrow k + 1 \in S$,

then $S = \mathbf{N}$.

Basic rule of inference:

If P_1, P_2 are statements satisfying

1. P_1 is true,
2. $P_1 \Rightarrow P_2$ is true,

then $P_1 \wedge P_2$ is true.

This extends to an infinite sequence of statements:

Principle of Mathematical Induction (PMI)

If (P_n) is a sequence of statements satisfying

1. P_1 is true,
2. $\forall k \in \mathbf{N}, P_k \Rightarrow P_{k+1}$ is true,

then $\forall n \in \mathbf{N}, P_n$ is true.

Examples