Principle of Mathematical Induction (1/2)

Let P_n be a proposition defined on the set of positive integers ($\forall n \in \mathbb{N}$).

First Form

If P_n satisfies the two properties:

1. P_1 is a true proposition,
2. if P_k is a true proposition, P_{k+1} is a true proposition.

Then, P_n is a true proposition for all positive integers ($\forall n \in \mathbb{N}$).

Principle of Mathematical Induction (2/2)

Let N be an integer.
Let P_n be a proposition $\forall n \geq N$, where $n \in \mathbb{N}$.

Second Form

If P_n satisfies the two properties:

1. P_N is a true proposition,
2. if P_k is a true proposition, then P_{k+1} is a true proposition.

Then, P_n is a true proposition for all $n \geq N$, where $n \in \mathbb{N}$.

Proof technique: Mathematical Induction

To prove that a proposition P_n is true for all $n \geq N$, where $n \in \mathbb{N}$.

1. Prove that the proposition P_n is true for the starting value N (usually $N = 1$ or $N = 2$).
2. Assume that the proposition P_n is true when $n = k$.
   And then prove that it is also true when $n = k + 1$. *In proving the proposition when $n = k + 1$, use the assumption that P_n is true when $n = k$.*
3. **Conclusion:** Then, by the Principle of Mathematical Induction, we can conclude that P_n is a true proposition for all $n \geq N$, where $n \in \mathbb{N}$.