Induction and indexing

The principle of mathematical induction says: If $p(\cdot)$ is a proposition over the universe of positive integers such that $p(1)$ is true and such that $p(n) \Rightarrow p(n+1)$ is true for all $n \geq 1$, then $p(n)$ is true for all n.

Let's expand this: If $p(\cdot)$ is a proposition over the universe of positive integers such that $p(1)$, $p(1) \Rightarrow p(2)$, $p(2) \Rightarrow p(3)$, $p(3) \Rightarrow p(4)$, $\ldots$ are all true, then $p(n)$ is true for all n.

We can re-index this as follows: If $p(\cdot)$ is a proposition over the universe of positive integers such that $p(1)$ is true and such that $p(n-1) \Rightarrow p(n)$ is true for all $n \geq 2$, then $p(n)$ is true for all n.

Sometimes this can be a handier form to use, in terms of keeping the algebra simple.