Strong Induction

Theorem

Suppose we know that $P(1)$ is true, and we know that for any $k \in \mathbb{N}$,

$$(P(1) \wedge P(2) \wedge \cdots \wedge P(k)) \implies P(k+1)$$

Then $\forall n \in \mathbb{N}, P(n)$.

- Like (vanilla) induction, but
- we can assume true for all integers $\leq k$ in the induction step.

We need a lemma:

$$(A \implies B) \iff (A \implies A \wedge B)$$