2.4 Induction

Let's try to prove that the following two induction principles, from p. 19 of *TAPL*, are equivalent. In the following, P is a predicate on the natural numbers.

The *principle of ordinary induction on natural numbers* says that:

> if $P(0)$
> and, for all $i \in \mathbb{N}$, $P(i)$ implies $P(i+1)$,
> then $P(n)$ holds for all $n \in \mathbb{N}$.

The *principle of complete induction on natural numbers* says that:

> if, for each $n \in \mathbb{N}$,
> > given $P(i)$ for all $i \in \mathbb{N}$ such that $i < n$,
> > we can show $P(n)$,
>
> then $P(n)$ holds for all $n \in \mathbb{N}$.