

**Exercise 4.3.** [1YP] Show that every  $n \in \mathbb{N}$  with  $n \neq 0$  is successor of another  $k \in \mathbb{N}$ , proving by induction on  $n$  this proposition

$$P(n) \stackrel{\text{def}}{=} (n = 0) \vee (\exists k \in \mathbb{N}, S(k) = n) \quad .$$

This shows that the successor function

$$S : \mathbb{N} \rightarrow \mathbb{N} \setminus \{0\}$$

is bijective.

If  $n \neq 0$ , we will call  $S^{-1}(n)$  the **predecessor** of  $n$ .

**Solution 1.** [22Q]

(Part of this result applies more generally, see [1Z1])