Why

We want to choose a distinct sequence of elements from an infinite set.[1]

What

Principle 1 (Choice)**.** *The Cartesian product of a nonempty family of nonempty sets is nonempty.*[2]

This sometimes called the *axiom of choice*. It is equivalent to saying that if for each $\alpha \in I$ we can choose a point $x_\alpha \in X_\alpha$ then we may construct a function $x \in \prod_{\alpha \in I} X_\alpha$ by setting $x(\alpha) = x_\alpha$

[1] Future editions will likely modify this why.

[2] Future editions will better motivate the axiom, and explain how it is not needed for finite sets or for sets with distinguishing features, but rather for infinitely many sets for which there is no selection criterion.

Choice Functions