



Direct Products

1 Why

We generalize the notion of a cartesian product to more than two sets.

2 Direct Products

The *direct product* of a natural family is the set of ordered sequences of elements from each set in the family. We call the elements of the direct product *n-tuples*.

2.1 Notation

Let A_1, \dots, A_n be a natural family of sets. We denote its direct product by

$$\prod_{i=1}^n A_i.$$

We read this notation as “product over α in I of A_α sub-alpha.” We denote an element of $\prod_{i=1}^n A_i$ by (a_1, a_2, \dots, a_n) with the understanding that $a_1 \in A_1, a_2 \in A_2, \dots, a_n \in A_n$.

If $A_i = A$ for $i = 1, \dots, n$, then we denote $\prod_{i=1}^n A_i$ by A^n .