



## Why

We name lists of lists, and so on.

## Definition

Let  $s$  be a sequence of natural numbers:  $s = (n_1, \dots, n_d)$ . An *array* of *size* (or *shape*)  $s$  is a function whose domain is the set

$$I = \{(m_1, \dots, m_d) \mid 1 \leq m_1 \leq n_1, \dots, 1 \leq m_d \leq n_d\}.$$

We call the set  $I$  the set of *indices* of the array. We call the codomain of the function the set of *values* of the array. If  $A$  is the set of values, we say that the array is *in*  $A$ . We call the length of  $s$  (here denoted  $d$ ) the *dimension* of the array.

### Case $d = 1$

If the shape of the array has length one, then the array is no different from a sequence. In this case, the terminology for arrays coincides with that for sequences.

### Case $d = 2$

If the shape of the array has length two, then the array can be thought of as a table with  $n_1$  rows and  $n_2$  columns.<sup>1</sup> We say that the array is two-dimensional.

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<sup>1</sup>Compare with Matrices

## Simplified indices

In the case that  $a$  is a one-dimensional array, or sequence, we use the common terminology  $a_i$  for the  $i$ th element of  $a$ . In the case that  $a$  is a two dimensional array, we write  $a_{ij}$  for  $a_{(i,j)}$ .

