Matrices

1 Why

2 Definition

Consider two sets: the natural numbers from 1 to n and those from 1 to m. Consider a third non-empty set. A *matrix of* elements of the third set is a function from the cartesian product of the first two sets of natural numbers to the third set. We call such a function a *matrix*

We think of the objects in the third set as arrayed in a grid or arrayed in a table. We call n and m the *dimensions* of the matrix. We call n the *height* and m the *width*. If the height of the matrix is the same as the width of the matrix then we call the matrix *square*. If the height is larger than the width, we call the matrix *tall*. If the width is larger than the height, we call the matrix *wide*.

2.1 Notation

Let S be non-empty set. We denote the set $n \times m$ over the set S by -valued matrices by $S^{n \times m}$. We often denote matrices by

upper-case latin numbers. Let $A \in S^{n \times m}$. This means the same as $A : \{1, \ldots, n\} \times \{1, \ldots m\} \to S$. We denote $A(i, j)$ by A_{ij}.