



## Permutation Matrices

### 1 Why

Permutations of the set  $\{1, 2, \dots, n\}$  correspond to matrices over  $\mathbf{N}$ .

### 2 Definition

The *matrix* corresponding to a permutation of  $\{1, 2, \dots, n\}$  is a matrix of natural numbers whose  $i, j$ th element is 1 if the permutation maps  $j$  to  $i$ ; for  $i, j \in \{1, 2, \dots, n\}$ .

### 3 Notation

Let  $\sigma : \{1, 2, \dots, n\} \rightarrow \{1, 2, \dots, n\}$  be a permutation. Let  $M \in \mathbf{N}^{n \times n}$  be such that  $M_{ij} = 1$  if  $\sigma j = i$ . Then  $M$  is the permutation matrix of  $\sigma$ .