



## Symmetric Matrices

### 0.1 Why

Matrices that have reflected values across their diagonals arise often.

### 0.2 Definition

A square matrix is *symmetric* if its values do not depend on the order of the indices. In other words, a matrix is symmetric if the value above and below the diagonal are a mirror image.

### 0.3 Notation

Let  $S$  be a nonempty set and  $A \in S^{n \times n}$ . Then  $A$  is symmetric if  $A_{ij} = A_{ji}$ . We denote the set of real-valued  $n$  by  $n$  symmetric matrices by  $\mathbf{S}^n$ .