

## SYMMETRIC REAL MATRICES

## **Definition**

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

## **Examples**

The matrix

$$\begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$$

is symmetric. The matrix

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

is not.

## Notation

 $A \in \mathbf{R}^{n \times n}$  is symmetric means  $A^{\top} = A$ .

We denote the set of symmetric  $n \times n$  real matrices by  $\mathbf{S}^n$ . So

$$\mathbf{S}^n = \{ A \in \mathbf{R}^{n \times n} \mid A^\top = A \}.$$

In particular,  $S^n \subset R^{n \times n}$ .

