Why

Matrices that have reflected values across their diagonals arise often.[1]

Definition

A square matrix is *symmetric* (we call it a *symmetric matrix*) 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.

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 $\mathbf{S}^n$. A symmetric matrix is the same as its tranpose. In other words, if A is symmetric, $A = A^\top$.

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[1]Future editions will clarify.