



Definition

The *square* of a square matrix is the product of the matrix with itself. A *square root* (or *matrix square root*) of a given matrix is a matrix whose square is the given matrix. A matrix is *idempotent* if it is equal to its square.

Notation

Let $A \in \mathbf{R}^{n \times n}$. Then the square of A is AA . We denote the square of A by A^2 . A is idempotent if $A^2 = A$. $B \in \mathbf{R}^{n \times n}$ is a square root of A if $A = B^2$.

Existence and uniqueness

Clearly a matrix can have a square root. Take for example the matrix in $\mathbf{R}^{1 \times 1}$ which is $\begin{bmatrix} 1 \end{bmatrix}$. A square root of this matrix is $\begin{bmatrix} 1 \end{bmatrix}$, but also $\begin{bmatrix} -1 \end{bmatrix}$. So matrix square roots do exist, but are not unique.

