Diagonalization

Definition: An $n \times n$ matrix A is said to be **diagonalizable** if there is a diagonal matrix D and an invertible $n \times n$ matrix P such that $P^{-1}AP = D$ (or equivalently, $AP = PD$ or $A = PDP^{-1}$).

Theorem: Let A be an $n \times n$ matrix. Then A is diagonalizable if and only if A has n linearly independent eigenvectors.

More precisely, there exist an invertible matrix P and a diagonal matrix D such that $P^{-1}AP = D$ if and only if the columns of P are n linearly independent eigenvectors of A and the diagonal entries of D are the eigenvalues of A corresponding to the eigenvectors in P in the same order.