Let $A$ be an $n \times n$ matrix and $\lambda$ be an eigenvalue of $A$. Then the eigenspace corresponding to $\lambda$ is defined to be $\text{Ker} \ (A - \lambda I_n)$. 
Let $A$ be an $n \times n$ matrix and $\lambda$ be an eigenvalue of $A$. Then the eigenspace corresponding to $\lambda$ is defined to be $\text{Ker } (A - \lambda I_n)$.

Let $A$ and $B$ be similar $n \times n$ matrices. Then

• they have the same eigenvalues. They may however have different eigenspaces.
• they have the same determinant and trace.
• they have the same rank and nullity.
Let $A$ be an $n \times n$ matrix and $\lambda$ be an eigenvalue of $A$. Then the eigenspace corresponding to $\lambda$ is defined to be $\text{Ker } (A - \lambda I_n)$.

Let $A$ and $B$ be similar $n \times n$ matrices. Then

- they have the same eigenvalues. They may however have different eigenspaces.
Let $A$ be an $n \times n$ matrix and $\lambda$ be an eigenvalue of $A$. Then the eigenspace corresponding to $\lambda$ is defined to be $\text{Ker} \ (A - \lambda I_n)$.

Let $A$ and $B$ be similar $n \times n$ matrices. Then

- they have the same eigenvalues. They may however have different eigenspaces.
- they have the same determinant and trace.
Let $A$ be an $n \times n$ matrix and $\lambda$ be an eigenvalue of $A$. Then the eigenspace corresponding to $\lambda$ is defined to be $\ker (A - \lambda I_n)$.

Let $A$ and $B$ be similar $n \times n$ matrices. Then

- they have the same eigenvalues. They may however have different eigenspaces.
- they have the same determinant and trace.
- they have the same rank and nulity.
Let $A$ be an $n \times n$ matrix and $\lambda$ be an eigenvalue of $A$. Then the eigenspace corresponding to $\lambda$ is defined to be $\text{Ker} \ (A - \lambda I_n)$. 

Let $A$ and $B$ be similar $n \times n$ matrices. Then

- they have the same eigenvalues. They may however have different eigenspaces.
- they have the same determinant and trace.
- they have the same rank and nullity.
Let us understand the characteristic equation. In general for an $n \times n$ matrix $A$, 

$$\det(A - \lambda I^n) = \lambda^n + \text{trace}(A)\lambda^{n-1} + \cdots + \det(A).$$

Therefore, $\det(A)$ is equal to the product of the eigenvalues of $A$, and the trace of $A$ is equal to the sum of the eigenvalues of $A$. 
Let us understand the characteristic equation. In general for an \( n \times n \) matrix \( A \),

\[
\det(A - \lambda I_n) = \lambda^n + \text{trace} A \lambda^{n-1} + \cdots + \det A
\]
Let us understand the characteristic equation. In general for an $n \times n$ matrix $A$,

$$\det(A - \lambda I_n) = \lambda^n + \text{trace} A \lambda^{n-1} + \cdots + \det A$$

Therefore, $\det A$ is equal to the product of the eigenvalues of $A$. 
Let us understand the characteristic equation. In general for an \( n \times n \) matrix \( A \),

\[
\det(A - \lambda I_n) = \lambda^n + \text{trace}A\lambda^{n-1} + \cdots + \det A
\]

Therefore, \( \det A \) is equal to the product of the eigenvalues of \( A \) and the trace of \( A \) is equal to the sum of the eigenvalues of \( A \).
A matrix $A$ is said to be diagonalizable if it is similar to a diagonal matrix.
A matrix $A$ is said to be diagonalizable if it is similar to a diagonal matrix. If $A$ is similar to a diagonal matrix $D$, then $A^k = S^{-1}D^kS$ for all $k \in \mathbb{N}$. 
A matrix $A$ is said to be diagonalizable if it is similar to a diagonal matrix. If $A$ is similar to a diagonal matrix $D$, then $A^k = S^{-1}D^kS$ for all $k \in \mathbb{N}$. A $n \times n$ matrix $A$ is diagonalizable if it has $n$ linearly independent eigenvectors.
A matrix $A$ is said to be diagonalizable if it is similar to a diagonal matrix. If $A$ is similar to a diagonal matrix $D$, then $A^k = S^{-1}D^kS$ for all $k \in \mathbb{N}$.

A $n \times n$ matrix $A$ is diagonalizable if it has $n$ linearly independent eigenvectors.

But when is a matrix diagonalizable in general?