Independent vectors

In linear algebra, vectors are said to be independent if no vector in the set can be written as a combination of the others. More formally, a set of vectors $\{v_1, v_2, \ldots, v_k\}$ is said to be linearly independent if the only scalars $c_1, c_2, \ldots, c_k$ such that

$$c_1v_1 + c_2v_2 + \ldots + c_kv_k = 0$$

In simpler terms, no vector in the set can be expressed as a linear combination of the other vectors. If the only way to get the zero vector as a linear combination of the vectors is by setting all the coefficients to zero, then the vectors are linearly independent.

On the other hand, if there exist non-zero coefficients $c_1, c_2, \ldots, c_k$ such that

$c_1v_1 + c_2v_2 + \ldots + c_kv_k = 0$, then the vectors are linearly dependent.

Linear independence is an important concept in linear algebra and has applications in various areas, including solving systems of linear equations, eigenvector calculations, and understanding the structure of vector spaces.

How to find number of independent vectors in a matrix?

To find the number of independent vectors in a matrix, we can use the concept of row echelon form or reduced row echelon form. We perform row operations to transform the matrix into its row echelon form and count the number of non-zero rows.