Linear Combination, Span, Linear Dependent and Independent, ...

Linear space V with vectors $\vec{v}_1,\ \vec{v}_2,\ \ldots,\vec{v}_k$

Linear Combination

$$a_1\vec{v}_1 + a_2\vec{v}_2 + \cdots + a_k\vec{v}_k$$

Span

Every vector in V can be written as some linear combination of these:

$$\vec{x} = a_1\vec{v}_1 + a_2\vec{v}_2 + \cdots + a_k\vec{v}_k$$

Linearly Independent

If $a_1\vec{v}_1 + a_2\vec{v}_2 + \cdots + a_k\vec{v}_k = 0$, then $a_1,\ a_2,\ldots a_k = 0$.

Linearly Dependent

Some $\vec{v}_j$ can be written as a linear combination of the others.

Basis

The vectors $\vec{v}_1,\ \vec{v}_2,\ \ldots,\vec{v}_k$ are both linearly independent and span V.

Dimension of V

The number k of vectors in a basis of V.