

Definition. If $\mathbf{v}_1, \dots, \mathbf{v}_p$ are vectors in \mathbb{R}^n , then the set of all possible linear combinations of $\mathbf{v}_1, \dots, \mathbf{v}_p$ is denoted by

$$\text{Span}\{\mathbf{v}_1, \dots, \mathbf{v}_p\}$$

Vectors of the form

$$c_1\mathbf{v}_1 + c_2\mathbf{v}_2 + \cdots + c_p\mathbf{v}_p$$

Note: Every scalar multiple of \mathbf{v}_1 (for example) is in $\text{Span}\{\mathbf{v}_1, \dots, \mathbf{v}_p\}$, because

$$c\mathbf{v}_1 = c\mathbf{v}_1 + 0\mathbf{v}_2 + \cdots + 0\mathbf{v}_p$$

The zero vector is always in $\text{Span}\{\mathbf{v}_1, \dots, \mathbf{v}_p\}$.

The only vectors in $\text{Span}\{\mathbf{v}_1\}$ are multiples of \mathbf{v}_1 .