subspace

Author and editors

Alexander Jung*, Department of Computer Science, Aalto University, Espoo, Finland (ORCID 0000-0001-7538-0990)
Editors: Konstantina Olioumtsevits (ORCID 0000-0003-2697-8659), Ekkehard Schnoor (ORCID 0000-0001-8252-1499), Aalto University, Espoo, Finland
*Corresponding author: alex.jung@aalto.fi

Abstract

Definition

A subset of a vector space $\mathcal{V}$ is a subspace of $\mathcal{V}$ if it is also a vector space with respect to the same operations as $\mathcal{V}$. Fig. 1 illustrates this for the vector space $\mathbb{R}^2$ (over the field $\mathbb{R}$).

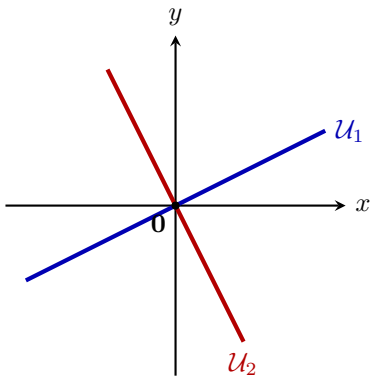

Figure 1: Any $\mathbf{x} \in \mathbb{R}^2$ defines a subspace of $\mathcal{U}_{\mathbf{x}} \subset \mathbb{R}^2$ by $\mathcal{U}_{\mathbf{x}} = \{\lambda \cdot \mathbf{x} : \lambda \in \mathbb{R}\} \subset \mathbb{R}^2$. For $\mathbf{x} \neq \mathbf{0}$, this corresponds to straight lines through the origin (illustrated by $\mathcal{U}_1$ and $\mathcal{U}_2$). For the zero vector $\mathbf{x} = \mathbf{0}$, this leads to the trivial subspace $\{\mathbf{0}\}$ just containing the zero vector

Cross References

vector space, dimension, basis

References

1.