



Differential Geometry

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Vector Fields

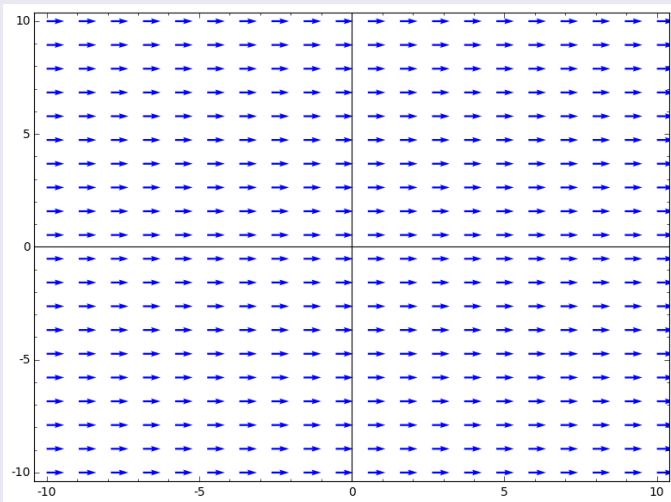
Definition (Vector)

A vector at a point $p \in \mathbb{R}^{n+1}$ is a pair $\vec{v} = (p, v)$ where $v \in \mathbb{R}^{n+1}$.

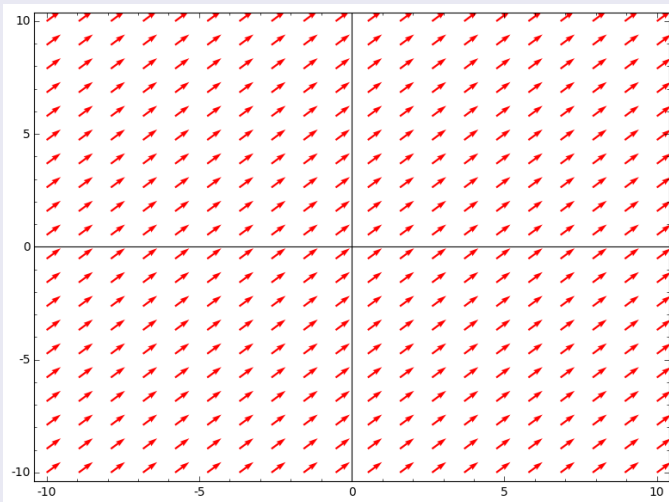
Definition

A vector field $\vec{X}$ on an open set $U \subset \mathbb{R}^{n+1}$ is a function assigns to each point of U a vector at that point. A vector field is represented by $\vec{X}(p) = (p, X(p))$ for some function $X : U \rightarrow \mathbb{R}^{n+1}$.

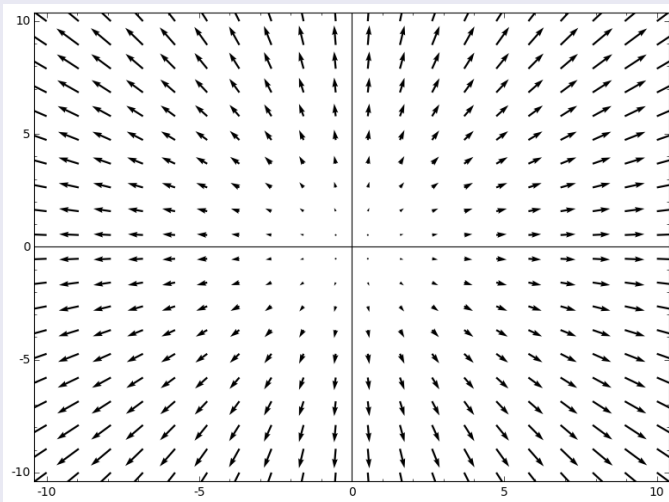
Example $X : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $X(p) = (1, 0)$



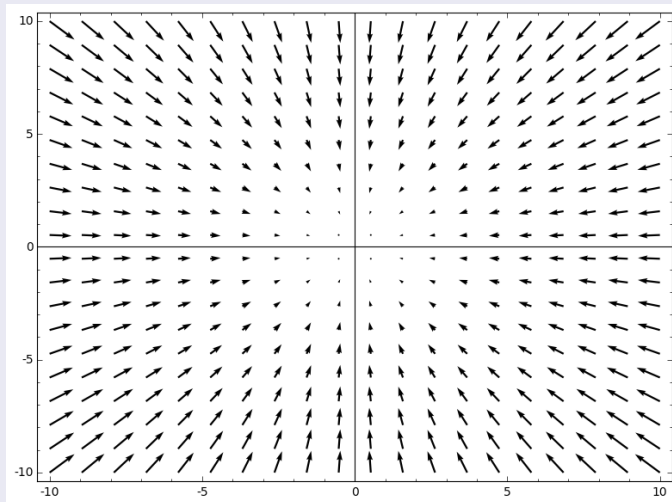
Example $X : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $X(p) = (1, 1)$



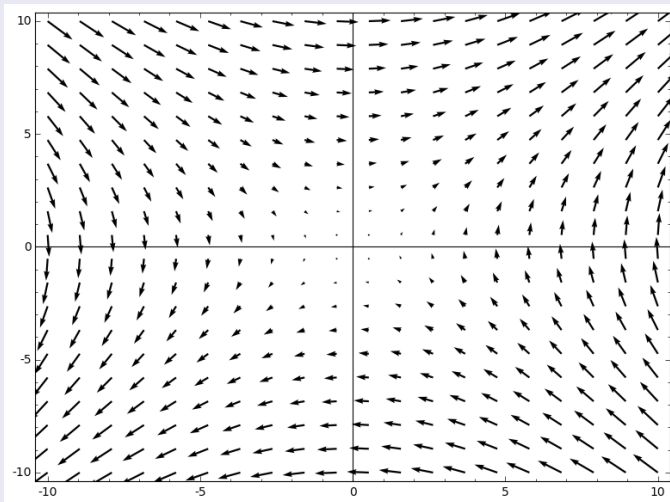
Example $X : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $X(p) = (p, p)$



Example $X : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $X(p) = (p, -p)$



Example $X : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $X((x, y)) = ((x, y), (y, x))$



Example $X : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $X((x, y)) = ((x, y), (-y, -x))$

