Definition of Scalar Multiplication

The product $k\vec{v}$ of a vector $\vec{v}$ and scalar k is a vector with a magnitude that is $|k| \cdot ||\vec{v}||$ and a direction that is equal to the direction of $\vec{v}$ if $k > 0$ and opposite the direction of $\vec{v}$ if $k < 0$. If $k = 0$ or $\vec{v} = \vec{0} \implies k\vec{v} = \vec{0}$