Axioms for a vector space

In the following, we assume that $\vec{u}, \vec{v}$, and $\vec{w}$ are any vectors in the vector space V and that c and d are any scalars.

1. $\vec{u} + \vec{v} = \vec{v} + \vec{u}$
2. $(\vec{u} + \vec{v}) + \vec{w} = \vec{u} + (\vec{v} + \vec{w})$
3. There exists a vector $\vec{0}$ in V such that

   $$\vec{v} + \vec{0} = \vec{v}$$

   for every vector $\vec{v}$.
4. For every vector $\vec{u}$ in the space there is an additive inverse, denoted $-\vec{u}$, such that

   $$\vec{u} + -\vec{u} = \vec{0}.$$

5. $c(\vec{u} + \vec{v}) = c\vec{u} + c\vec{v}$
6. $(c + d)\vec{u} = c\vec{u} + d\vec{u}$
7. $c(d\vec{u}) = (cd)\vec{u}$
8. $1\vec{u} = \vec{u}$