Subspaces of Vector Spaces

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- A non-empty subset $\mathbf{W}$ of vector space $\mathbf{V}$ is called a subspace of $\mathbf{V}$ if $\mathbf{W}$ is itself a vector space under addition and scalar multiplication defined on $\mathbf{V}$
    1. If $\vec{\mathbf{u}}$ and $\vec{\mathbf{v}}$ are in $\mathbf{W}$, then $\vec{\mathbf{u}} + \vec{\mathbf{v}}$ is in $\mathbf{W}$
    2. If $\vec{\mathbf{u}}$ is in $\mathbf{W}$, and c is any scalar, then $c\vec{\mathbf{u}}$ is in $\mathbf{W}$
    3. Ex. $\mathbb{R}^2$ is a vector space, then $\{(x, 2x)\}$ is a subspace of $\mathbb{R}^2$, but $\{(x, 2x + 1\}$ is not
- Verify that $\mathbf{W}$ is a subspace of $\mathbf{V}$
    1. $\mathbf{W} \leq \mathbf{V}$
    2. $\mathbf{W}$ not empty
    3. $\vec{\mathbf{u}} + \vec{\mathbf{v}} \in \mathbf{W}$
    4. $c\vec{\mathbf{u}} \in \mathbf{W}$