Mark each statement True or False. Justify each answer.

1. For any scalar c, $\mathbf{u} \cdot (c\mathbf{v}) = c(\mathbf{u} \cdot \mathbf{v})$.

2. If the distance from $\mathbf{u}$ to $\mathbf{v}$ equals the distance from $\mathbf{u}$ to $-\mathbf{v}$, then $\mathbf{u}$ and $\mathbf{v}$ are orthogonal.

3. If vectors $\mathbf{v}_1, \ldots, \mathbf{v}_p$ span a subspace W and if $\mathbf{x}$ is orthogonal to each $\mathbf{v}_j$ for $j = 1, \ldots, p$, then $\mathbf{x}$ is in $W^{\perp}$.

4. For any scalar c, $\|c\mathbf{v}\| = c\|\mathbf{v}\|$.

5. If $\|\mathbf{u}\|^2 + \|\mathbf{v}\|^2 = \|\mathbf{u} + \mathbf{v}\|^2$, then $\mathbf{u}$ and $\mathbf{v}$ are orthogonal.

6. Not every linearly independent set in $\mathbb{R}^n$ is an orthogonal set.

7. The orthogonal projection of y onto $\mathbf{v}$ is the same as the orthogonal projection of y onto $c\mathbf{v}$ whenever $c \neq 0$.