Example 1. Let $\mathbf{u} = \langle 1, -2, 2\rangle$ and $\mathbf{v} = \langle -3, -3, 5\rangle$. Compute $\mathbf{u} \cdot \mathbf{v}$.

Example 2. Find the angle between the vectors $\mathbf{u} = \mathbf{i} + 2\mathbf{j} - \mathbf{k}$ and $\mathbf{v} = \mathbf{j} + 3\mathbf{k}$.

Example 3. Determine whether the vectors $\mathbf{u} = 3\mathbf{i} - 2\mathbf{j} + \mathbf{k}$ and $\mathbf{v} = 2\mathbf{j} + 4\mathbf{k}$ are orthogonal.

Example 4. Find $\text{proj}_{\mathbf{v}}\,\mathbf{u}$ and $\text{comp}_{\mathbf{v}}\,\mathbf{u}$ if $\mathbf{u} = 6\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}$ and $\mathbf{v} = \mathbf{i} - 2\mathbf{j} - 2\mathbf{k}$.
