1. (2 points) Suppose \( \vec{u} = 2\vec{i} + 4\vec{j} + 4\vec{k} \) and \( \vec{v} = \vec{j} + \vec{k} \). Determine \( |2\vec{u} - 3\vec{v}| \).

2. (2 points) Determine a unit vector which has the opposite direction of \( \vec{w} = \langle 4, 3, 1 \rangle \).

3. (2 points) Find all values of \( a \) for which the vectors \( \langle a, -3, 1 \rangle \) and \( \langle a, 2a, -7 \rangle \) are orthogonal.
4. (2 points) Determine the angle between vectors $\vec{v} = \langle 1, 1, \sqrt{6} \rangle$ and $\vec{w} = \langle -1, -1, \sqrt{6} \rangle$.

5. (2 points) Determine $\vec{u} \times \vec{v}$ given that $\vec{u} = \langle 7, -1, -3 \rangle$ and $\vec{v} = \langle -2, 2, 2 \rangle$. 