1. (3) Determine the equation of the plane which passes through (6, 2, −3) and is normal to the vector \( \vec{w} = 4\vec{i} - 5\vec{j} + \vec{k} \). Write your answer in the form \( ax + by + cz = d \).

2. (3) Consider the vectors

\[
\vec{a} = \vec{i} - \vec{j} + 6\vec{k} \quad \vec{b} = 4\vec{i} - \vec{j} - 2\vec{k} \quad \vec{v} = 2\vec{i} - 2\vec{j} - 3\vec{k} \quad \vec{w} = \vec{i} + 3\vec{j}
\]

Determine whether the vectors \( \vec{a} + \vec{b} \) and \( \vec{v} + \vec{w} \) are orthogonal to one another.
3. (5) Consider the vectors $\vec{q} = 5\vec{i} - \vec{j} - 4\vec{k}$ and $\vec{m} = 3\vec{i} + \vec{j} + 2\vec{k}$. Determine the component of $\vec{q}$ that points in the same direction as $\vec{m}$.

4. (2ea) Consider the plane $z = 4x - 3y + 7$.
   
   (a) Find a nonzero vector perpendicular to the plane.

   (b) Find a nonzero vector parallel to the plane.
5. (5) Consider the vector \( \vec{w} = 5\vec{i} + 4\vec{j} + 2\vec{k} \), and the vector \( \vec{v} \) which has the following properties:

- \( \| \vec{v} \| = \sqrt{29} \)
- \( \vec{v} \cdot \vec{w} = 6 \)
- \( \vec{v} - 2\vec{j} \) is orthogonal to \( \vec{w} + \vec{i} \)
- All components of \( \vec{v} \) are integers

Determine the component form of the vector \( \vec{v} \) which satisfies these properties.

[That is, if \( \vec{v} = a\vec{i} + b\vec{j} + c\vec{k} \), determine \( a \), \( b \), and \( c \).]