Consider the following vectors:

\[ \vec{a} = \langle 1, 4, 1 \rangle \]
\[ \vec{b} = \langle 2, 0, 0 \rangle \]

1. (5 points) Find a unit vector with the same direction as \( \vec{a} \).

2. (5 points) Find the cosine of the angle between \( \vec{a} \) and \( \vec{b} \).
3. (5 points) Find a vector perpendicular to both \( \vec{a} \) and \( \vec{b} \).

4. (5 points) Find the equation of a plane passing through the origin \((0, 0, 0)\) containing the points \((1, 4, 1)\) and \((2, 0, 0)\). (Hint: Use part (3).)