• No calculators allowed.
• Show sufficient work to justify each answer.
• You have 15 minutes for this quiz.

1. (2 points) Given two nonzero vectors $\vec{u}$ and $\vec{v}$ which are not parallel, are $\vec{u} \times \vec{v}$ and $\vec{v} \times \vec{u}$?

2. (2 points) Determine a vector of length 6 having the opposite direction of $\vec{w} = \langle 1, -2, 2 \rangle$.

3. (2 points) Find all values of $a$ for which the vectors $\langle a^2, 3, 8 \rangle$ and $\langle 2, 2a, -1 \rangle$ are orthogonal.
4. (2 points) Determine the angle between vectors \( \vec{v} = (1, 2, 2) \) and \( \vec{w} = (3, 1, 2) \).

5. (2 points) Find the vector, not with determinants, but by using properties of cross products and right hand rule we discussed.

\[
((\vec{k} - \vec{j}) \times \vec{i}) \times \vec{i}
\]