MATH 243: SECTION 12.3 GROUPWORK

(1) Determine whether the two vectors $\langle -1/2, 4, 3\rangle$ and $\langle -4, 6, -2\rangle$ are orthogonal. If not, determine the angle between them.
(2) Consider the two vectors $\vec{v} = \langle -2, 1, -4\rangle$ and $\vec{w} = \langle 3, 0, 1\rangle$. Find the vector projection of $\vec{v}$ onto $\vec{w}$ and $\vec{w}$ onto $\vec{v}$.
(3) Consider two vectors $\vec{v}$ and $\vec{w}$. Show that the orthogonal projection of $\vec{v}$ onto $\vec{w}$, defined as $\text{orth}_{\vec{w}}(\vec{v}) = \vec{v} - \text{proj}_{\vec{w}}(\vec{v})$, is orthogonal to $\vec{w}$.