WTW 124 CLASS TEST 1

Show your steps clearly and note that this is a closed book test.

1. Consider the vectors $\bar{u} = \langle 1, 1, 2 \rangle$, $\bar{v} = \langle 0, 1, 0 \rangle$ and $\bar{w} = \langle 0, 1, 1 \rangle$ in $\mathbb{R}^3$. Find (if possible) the value of $\bar{u} + (\bar{v} \cdot \bar{w})$. [2]

2. Let $\bar{u}$ and $\bar{v}$ be vectors in $\mathbb{R}^n$. Prove that if $\bar{u}$ and $\bar{v}$ are not parallel and $a\bar{u} + b\bar{v} = a_1\bar{u} + b_1\bar{v}$ for $a, a_1, b, b_1 \in \mathbb{R}$, then $a = a_1$ and $b = b_1$. [3]

3. Find α such that the vectors $\bar{u} = \langle -3, \alpha, 2-\alpha \rangle$ and $\bar{v} = \langle 2, \alpha, \alpha - 2 \rangle$ are orthogonal. [2]

4. Consider the lines

$$L_1 = \{\langle 1+t, 2, 3+2t \rangle : t \in \mathbb{R}\} \text{ and } L_2 = \{\langle 1, 2, 2+s \rangle : s \in \mathbb{R}\}.$$

Show in details that $L_1 \neq L_2$. [3]