Math 3160 - Quiz 5

Name:_____

1. Let $\mathbf{v_1} = (1, -1)$, $\mathbf{v_2} = (2, -1)$ and $\mathbf{v_3} = (-2, 2)$ be vectors in $\mathbb{R}^2$.
   - Is $\mathbf{v_1}$, $\mathbf{v_2}$ independent?
   - Is $\mathbf{v_1}$, $\mathbf{v_3}$ independent?
2. What is the definition of independence?
3. Assume $\mathbf{v_1} = 3\mathbf{v_1} - 2\mathbf{v_1}$. Prove $\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}$ is not independent.
4. Let $\mathbf{v_1} = (1, 0, -1)$, $\mathbf{v_2} = (2, 1, -1)$ and $\mathbf{v_3} = (-2, 0, 2)$ be vectors in $\mathbb{R}^3$.
   - Does $\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$ independent?
   - Is $\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$ independent?
   - Is $\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$ a basis for $\mathbb{R}^3$?
5. Let $\mathbf{v_1} = (1, 0, 0, 0)$, $\mathbf{v_2} = (1, 0, 0, -1)$ and $\mathbf{v_3} = (1, 1, 1, 1)$ and $\mathbf{v_4} = (0, 1, 1, 0)$ be vectors in $\mathbb{R}^4$.
   - Show $\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$, $\mathbf{v_3}$ is not a basis.
   - Find a basis for the span of $\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$, $\mathbf{v_3}$.
   - What is the dimension of the span of $\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$, $\mathbf{v_3}$?
   - Is (1,2,3,4) in the span of $\mathbf{v_1}$, $\mathbf{v_2}$, $\mathbf{v_3}$, $\mathbf{v_3}$?