Math 3160 - Quiz 3

Name:_____

To receive credit you must show your work.

1. Prove W is a subspace of V.
   (a) $W = \{(x, y, z) | x - y = 0\} \in V = \mathbb{R}^3$
   (b) $W = \{(t, 3t, 0) | t \in \mathbb{R}\} \in V = \mathbb{R}^3$
   (c) $W = \{(u - t, t, 3t, u) | u, t \in \mathbb{R}\} \in V = \mathbb{R}^4$
2. Prove W is not a subspace of V.
   (a) $W = \{(x, y, z) | x - y = 7\} \in V = \mathbb{R}^3$
   (b) $W = \{(t, 3t, 2) | t \in \mathbb{R}\} \in V = \mathbb{R}^3$
3. Let $\mathbf{v_1} = (2, 1, 0)$, $\mathbf{v_2} = (1, 0, 2)$, and $\mathbf{v_3} = (3, 3, -6)$.
   (a) Is $\mathbf{v} = (3, 3, 3)$ in the span of $\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}$? If yes, what is a linear combination to demonstrate this?
   (b) Is $\mathbf{v} = (1, 1, -2)$ in the span of $\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}$? If yes, what is a linear combination to demonstrate this?
   (c) Does $\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}$ span $\mathbb{R}^3$? Why or why not?
4. Let $\mathbf{v_1} = (2, 1, 0)$, $\mathbf{v_2} = (1, 0, 1)$, and $\mathbf{v_3} = (1, 0, 0)$.
   (a) Is $\mathbf{v} = (3, 3, 3)$ in the span of $\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}$? If yes, what is a linear combination to demonstrate this?
   (b) Is $\mathbf{v} = (1, 1, -2)$ in the span of $\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}$? If yes, what is a linear combination to demonstrate this?
   (c) Does $\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}$ span $\mathbb{R}^3$? Why or why not?
5. Let $\mathbf{v_1} = (2, 1, 0)$, $\mathbf{v_2} = (1, 0, 2)$, and $\mathbf{v_3} = (3, 3, -6)$. Is this set of vectors linearally independent? If it is show why, if it is not show a linear combination that is the zero vector.
6. Let $\mathbf{v_1} = (2, 1, 0)$, $\mathbf{v_2} = (1, 0, 1)$, and $\mathbf{v_3} = (1, 0, 0)$. Is this set of vectors linearally independent? If it is show why, if it is not show a linear combination that is the zero vector.
7. Let $\mathbf{v_1} = (2, 1, 0)$, $\mathbf{v_2} = (1, 0, 2)$, and $\mathbf{v_3} = (3, 3, -6)$. Find a basis for the span of this set.

8. Let $\mathbf{v_1} = (2, 1, 0)$, $\mathbf{v_2} = (1, 0, 1)$, and $\mathbf{v_3} = (1, 0, 0)$. Find a basis for the span of this set.