Math 3160 - Quiz 4

Name:_____

1. What is the definition of a vector space?
2. Prove $W = \{(x, y, z) | x + y = 0\}$ is a subspace of $\mathbb{R}^3$.
3. Prove $W = \{(t, s + t, 0) | s, t \in \mathbb{R}\}$ is a subspace of $\mathbb{R}^3$.
4. Prove $W = \{(x, y, z) | x + y = 2\}$ is not a subspace of $\mathbb{R}^3$.
5. Is $(1, 2, 3) \in span((4, 5, 6), (7, 8, 9))$? If yes what is a linear combination of $(4, 5, 6)$, (7,8,9) that equals (1,2,3)?
6. Let $\mathbf{v_1} = (1, -1)$, $\mathbf{v_2} = (2, -1)$ and $\mathbf{v_3} = (-2, 2)$ be vectors in $\mathbb{R}^2$.
   - Does $\mathbf{v_1}$, $\mathbf{v_2}$ span $\mathbb{R}^2$?
   - Does $\mathbf{v_1}$, $\mathbf{v_3}$ span $\mathbb{R}^2$?