

Math 3160 - Quiz 5

Name: _____

1. Write down two equivalent definitions for a list of vectors to be **independent**.
2. Show each of the following lists are independent or dependent
 - (a) $(1, 2, 3), (1, 0, -1)$ in $\mathbb{R}^3$
 - (b) $(1, 2, 3), (4, 5, 6), (7, 8, 9)$ in $\mathbb{R}^3$
 - (c) $x, 1 + x, 1 - x$ in $\mathcal{P}_2$
3. Write down the definition for a **basis** of a vector space. Write down the definition for **span**.
4. Are $v = (-1, 6, 5, -2)$ or $v = (1, 1, 0, 1)$ in the span of the following set of vectors?

$$\{(1, 2, 0, 1), (1, 0, -1, 2), (0, 1, 1, 1), (1, 7, 3, 0)\}$$

5. Show the following are or are not a basis for the given vector space. Explain why or why not it is a basis.
 - (a) $(1, 2, 3), (4, 5, 6), (2, 3, 1)$ in $\mathbb{R}^3$
 - (b) $(1, 2, 3), (4, 5, 6), (7, 8, 9)$ in $\mathbb{R}^3$
 - (c) $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3, \mathbf{v}_4$ in $\mathbb{R}^3$
 - (d) $(1, 0, 1), (0, 1, 2)$ in $W = \{(a, b, a + 2b) | a, b \in \mathbb{R}\}$
6. For the following set of vectors find a basis for their span and find the dimension of their span.
 - (a) $(1, 2, 3), (4, 5, 6), (2, 3, 1)$
 - (b) $(1, 2, 3), (4, 5, 6), (7, 8, 9)$
 - (c) $(1, 0, 1), (0, 1, 2)$