Math 3160 - Quiz 4

Name:_____

To receive credit you must show your work.

1. What is the definition that $T : V \to W$ is linear?
2. Prove the following transformations, T, ar linear.
   (a) $T(x, y) = (3x - y, x)$.
   (b) $T(v) = Av$ where A is a 3x2 matrix and $v \in \mathbb{R}^2$.
3. Prove the following transformations, T, are not linear.
   (a) $T(x, y) = (3 - y, x)$.
   (b) $T(x, y) = (x^2, y)$.
4. Compute the range (give a basis for the range) and the Null space for the the following transformations, T.
   (a) $T(x, y) = (3x - y, x)$.
   (b) $T(x, y) = (-y, x, 0)$.
   (c) $T(x, y, z) = (z - y, x)$.
5. Compute the range (give a basis for the range) and the Null space for the the following transformations, $Tv = Av$.
   (a)
   $$A = \begin{bmatrix} 2 & 4 \\ -1 & 2 \end{bmatrix}$$
   (b)
   $$A = \begin{bmatrix} 2 & 4 \\ -1 & 2 \end{bmatrix}$$
   (c)
   $$A = \begin{bmatrix} 2 & 4 \\ 1 & 2 \\ 0 & 4 \\ 3 & 0 \end{bmatrix}$$