Math 3160 - Quiz 5

Name:_____

1. 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) $(1,0,1),(0,1,2)$
2. Let $B = \{(1,2,1),(0,1,2),(0,-1,0)\}$.
   (a) Is B a basis for $\mathbb{R}^3$
   (b) Write the vector $(1,0,-1)$ relative to the basis B.
   (c) Write the vector (a,b,c) relative to the basis B.
   (d) Find the change of basis matrix from the standard basis to the basis B. (we called it $P_{\text{STANDARD}\to B}$ in class).
3. For the following system of linear equations.
$$\begin{array}{rrrrrl} 2x_1 & -2x_2 & +4x_3 & & -6x_5 & = 2 \\ & & x_3 & +6x_4 & & = 0 \end{array}$$
   (a) Find the solution set.
   (b) Find a basis for the solution set.
   (c) What is the dimension of that solution set?
4. For the following subspace of P_3
$$W = \{a + bx + cx^2 + dx^3 : a = -c \text{ and } b = c + d\}$$
   (a) Find a basis for W.
   (b) What is the dimension of that solution set?
5. Find a a basis and dimension for the following.
   (a) $span((1,-2,1),(1,1,1),(-2,3,-2))$
   (b) $\{(x,y,z,w) \in \mathbb{R}^4 : x + y - 2z = 0 \text{ and } 3y - z - w = 0\}$
6. Let $B_1 = \{(-1,1),(2,3)\}$, $B_2 = \{(1,-1),(1,1)\}$ and let B be the standard unit basis for $\mathbb{R}^2$.

(a) Find the change of basis matrices for $P_{B_1 \to B_2}$ and $P_{B_1 \to B_2}$.

(b) Find the coordinates of the point $(4, 6)$ (given in the standard basis) relative to the bases B_1 and B_2.

(c) Find the change of basis matrices for $P_{B \to B_2}$ and $P_{B_2 \to B}$.

(d) Find the coordinates of the point $(2, -4)$ (given in the standard basis) relative to the bases B and B_2. Graph this point the two separate coordinate axes B and B_2.