Math 1553: Intro to Linear Algebra

Section 1.3: Span

Name: _____

1. Write the vector $\begin{bmatrix} 6 \\ 11 \\ 6 \end{bmatrix}$ as a linear combination of the vectors $\mathbf{u}=\begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix}$, $\mathbf{v}=\begin{bmatrix} 1 \\ -1 \\ 3 \end{bmatrix}$, and $\mathbf{w}=\begin{bmatrix} 3 \\ 2 \\ 5 \end{bmatrix}$.

2. Are the statements below true or false? If the statement is true, prove it. If it is false, provide a counterexample to show that it is false.

(a) The dimension of the span of a set of vectors is equal to the number of unpivoted columns in the row-reduced matrix.

(b) Every set of four or more vectors in $\Re^3$ will span $\Re^3$.

(c) The span of any set must contain the zero vector.

3. Describe the span of the vectors. If the span is a line or plane, find the equation.

(a) $\vec{v_1} = \begin{bmatrix} -1 \\ 3 \\ 2 \end{bmatrix}$, $\vec{v_2} = \begin{bmatrix} 1 \\ -1 \\ -4 \end{bmatrix}$, $\vec{v_3} = \begin{bmatrix} 1 \\ 0 \\ -5 \end{bmatrix}$

(b) $\vec{v_1} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, $\vec{v_2} = \begin{bmatrix} -3 \\ -6 \\ -9 \end{bmatrix}$, $\vec{v_3} = \begin{bmatrix} -1 \\ -2 \\ -3 \end{bmatrix}$