Math 320 Linear Algebra
Assignment # 4

1. Consider:

$$A = \begin{bmatrix} 0 & 1 & 3 & 0 & -2 \\ 3 & 0 & -6 & 0 & 15 \\ 1 & 0 & -2 & 1 & 9 \\ 2 & -3 & -13 & 0 & 16 \end{bmatrix}$$

and

$$\vec{b} = \begin{bmatrix} -6 \\ 57 \\ 32 \\ 56 \end{bmatrix}$$

.

(a) Show that

$$A \begin{bmatrix} 2 \\ 3 \\ -1 \\ 1 \\ 3 \end{bmatrix} = \vec{b}$$

(b) Find the solution set to the homogenous system of linear equations:

$$A\vec{x} = \vec{0}.$$

Write your answer in the form of a spanning set (or a vector plus a spanning set).

(c) Find the solution set to the system of linear equations:

$$A\vec{x} = \vec{b}.$$

Write your answer in the form of a spanning set (or a vector plus a spanning set).

2. Show that vector space properties 2 and 8 hold for the vector space $\mathbb{R}^m$.

3. Show that vector space properties 4,5 and 9 hold for the vector space P_n (that is the space of polynomials of degree less than n.)

4. Show that vector space properties 7 hold for the vector space $\mathbb{R}^{m \times n}$ (that is the matrices of size $m \times n$.

5. The polynomials $x + 1$ and $x^2 + 2$ are "vectors" in the vector space P_2. Describe the set span($x + 1, x^2 + 2$).

6. Let V be a vector space.

(a) Show that if $\vec{v}, \vec{w} \in V$ and $\vec{v} + \vec{w} = \vec{0}$ then $\vec{w} = -\vec{v}$.

(b) Show that if $\vec{v} \in V$ then $(-1)\vec{v} = -\vec{v}$.