Math 333 (2004) Assignment 5

(Due: October 28, 2004 in class)
Maximum 50 points

1. (10) Let $b = (2,0,0)^T$ and

$$A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & 1 & -1 \\ -1 & -1 & 1 \end{bmatrix}$$

Determine if $b \in col(A)$ and if it is, express it as a linear combination of the columns of A.

2. (5) Find the vector form of the general solution of the linear system

$$\begin{aligned} x_1 - 3x_2 &= 1 \\ 2x_1 - 6x_2 &= 2 \end{aligned}$$

3. (15) For the matrix A defined below, find a basis for $row(A)$, $N(A)$ and $col(A)$.

$$A = \begin{bmatrix} 1 & 4 & 5 & 2 \\ 2 & 1 & 3 & 0 \\ -1 & 3 & 2 & 2 \end{bmatrix}$$

4. (10) For each of the following sets of vectors $S \subset V$, find a basis for $W = span(S)$ which contains only elements of S

a) $V = \mathbb{R}^4 \quad , \quad S = \left\{(1,1,0,0)^T, (0,0,1,1)^T, (-2,0,2,2)^T, (0,-3,0,3)^T\right\}$

b) $V = P_3 \quad , \quad S = \left\{x^3+1, 4-x, 3x^3+x, x^3+2\right\}$

5. (10) Determine a basis for $W = span(S) \subset M_{22}$ where S is defined below. Do so by determining a basis for $row(A)$ where A is the matrix having the coordinates of v_k relative to the standard basis E of M_{22} (not as column vectors).

$$S = \{v_1, v_2, v_3\} = \left\{ \begin{bmatrix} 1 & 2 \\ -1 & 0 \end{bmatrix}, \begin{bmatrix} 8 & 1 \\ 7 & 3 \end{bmatrix}, \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}, \right\}$$