Math 1410–Assignment 7

Due Friday Nov. 18, 2005 before the lecture in the class

1. Determine if the following two sets of vectors span the same vector space:
   $S = \{(1,1,1,2),(0,1,1,1),(1,0,0,1)\}$, $T = \{(-1,1,1,0),(2,1,1,3),(1,2,2,3)\}$.

2. Let A be an invertible 3×3 matrix.

   (a) Show that the reduced echelon form of A is the identity matrix of order 3.

   (b) Explain why the row space of A is all of $\mathbb{R}^3$.

3. Given that $S = \{(-1,1,1,1),(-1,-1,1,1),(-1,-1,-1,1)\}$. Determine which of the vectors $\underline{v} = (2,3,4,-2)$, $\underline{u} = (1,2,3,4)$, are in the span of S?

4. Which of the following sets of vectors are linearly independent?

   (a) $\{(0,1,-1),(-1,0,1),(1,-1,0)\}$

   (b) $\{(-1,1,1,1),(-1,-1,1,1),(-1,-1,-1,1)\}$

5. Select a linearly independent subset of

   $$S = \{(1,1,1,1),(0,2,-1,0),(1,3,0,1),(3,3,1,3)\}$$

   that spans the same subspace of $\mathbb{R}^4$ as S does.

6. Find a basis for the span of the set of vectors
   $\{(-1,1,1,1),(0,1,-1,1),(1,0,-2,0),(1,1,-1,0)\}$

7. Determine if the set of vectors $\{(-1,1,1),(-1,1,-1),(-1,-1,1)\}$ is a basis for $\mathbb{R}^3$.

8. Let $A = \begin{bmatrix} 1 & 1 & 0 & 1 & 1 \\ -1 & 1 & 1 & 0 & 1 \\ 0 & 2 & 1 & 1 & 2 \end{bmatrix}$. Find the dimension of:

   (a) the row space of A,

   (b) the solution set of the equation $A\underline{x} = 0$ (note that $\underline{x}$ is a column vector).