F11

Homework 7

due on 10/24/11

Exercises
6,9,21
1,2,4,6,9,10,19

#1. Let V be a vector space and U and W subspaces of V with $U \cap W = \{0\}$. Let (u_1, \ldots, u_n) be a linearly independent list in U and (w_1, \ldots, w_m) a linearly independent list in W. Show that

$$(u_1,\ldots,u_n,w_1,\ldots,w_m)$$

is a linearly independent list in V.

#2. Let

$$A = \begin{bmatrix} 1 & 2 & 3 & 0 & 0 \\ 1 & 3 & 4 & 1 & 2 \\ 2 & 5 & 7 & 1 & 1 \\ 0 & 1 & 2 & 3 & 4 \end{bmatrix}$$

Find bases for ColA, RowA and NulA.

#3. Consider the following vectors in \mathbb{R}^6 :

$$u_{1} = \begin{bmatrix} 1\\0\\1\\0\\1\\0\\1\\0 \end{bmatrix}, u_{2} = \begin{bmatrix} 1\\1\\1\\1\\1\\1\\1 \end{bmatrix}, u_{3} = \begin{bmatrix} 3\\1\\1\\3\\1\\1\\1\\1 \end{bmatrix}, w_{1} = \begin{bmatrix} 1\\1\\1\\1\\0\\0\\0\\0\\0 \end{bmatrix}, w_{2} = \begin{bmatrix} 0\\0\\0\\1\\1\\1\\1\\1 \end{bmatrix}, \text{ and } w_{3} = \begin{bmatrix} 1\\2\\3\\4\\5\\6 \end{bmatrix}.$$

Put $U = \operatorname{span}(u_1, u_2, u_3)$ and $W = \operatorname{span}(u_1, u_2, u_3, w_1, w_2, w_3)$. Find a sublist (x_1, \ldots, x_n) of (u_1, u_2, u_3) and a sublist (y_1, \ldots, y_m) of (w_1, w_2, w_3) , such that (x_1, \ldots, x_n) is basis for U and $(x_1, \ldots, x_n, y_1, \ldots, y_m)$ is a basis for W.