**Department of Aerospace Engineering**

**AE602 Mathematics for Aerospace Engineers**

**Assignment No. 4**

**4.1** Decide whether or not the following vectors are linearly independent, by solving

Decide also if they span by trying to solve

**4.2** Decide the dependence or independence of

(a)

(b) for any vectors ,

(c) for any numbers .

**4.3** Prove that if any diagonal element of

is zero, the rows are linearly dependent.

**4.4** Is it true that if are linearly dependent, then also the vectors are linearly independent? (Hint: Assume some combination and find which are possible.)

**4.5** Describe geometrically the subspace of spanned by

(a)

(b)

(c) all six of these vectors. Which two form a basis?

(d) all vectors with positive components.

**4.6** To decide whether is in the subspace spanned by let the vectors be the columns of and try to solve . What is it the result for

(a)

(b)and any ?

**4.7** By locating the pivots, find a basis for the column space of

Express each column that is not the basis as a combination of the basic columns. Find also a matrix with this echelon form , but a different column space.

**4.8** Find the dimension and construct a basis for the four subspaces associated with each of the matrices

**4.9** Find the dimension and a basis for the four fundamental subspaces for both

**4.10** Describe the four subspaces in 3-dimensional space associated with

**4.11** Find the rank of and write the matrix as:

**4.12** Find a left-inverse and/or a right –inverse (when they exist) for

and and