Fall 2008 **ARE211**

Problem Set #05

Second Lin Algebra Problem Set

Due date: Oct 09

Problem 1

What is the difference between a minimum spanning set for a vector space and a basis for a vector space. Provide an example highlighting this difference.

Problem 2

Simon & Blume question 11.2 (page 243). Explain your answer.

Problem 3

Simon & Blume question 11.9 (page 246).

Problem 4

Simon & Blume question 11.14 (page 249). Explain your answer.

Problem 5

Consider the following conjecture: Let V be a vector space spanned by the set $\{\mathbf{v}_1, \mathbf{v}_2, ...\mathbf{v}_n\}$. The set $\{\mathbf{v}_1, \mathbf{v}_2, ...\mathbf{v}_n\}$ is a minimal spanning set for V iff the vectors $\mathbf{v}_1, \mathbf{v}_2, ...\mathbf{v}_n$ are linearly independent vectors. Is the conjecture true? Prove your answer.

Problem 6

Let U and W be vector subspaces of the vectorspace V. Define the space

$U + W = \{\mathbf{x}|\mathbf{x} = \mathbf{u} + \mathbf{w}, \mathbf{u} \in U, \mathbf{w} \in W\}$ Show that $U + W$ is a vector subspace of V.

Problem 7

a) Let A be a symmetric (nxn) matrix with one or more negative eigenvalues. What can you say about the determinant of the matrix and its rank?

b) Let A be symmetric (2x2) matrix. Is it true that A is indefinite iff its determinant is negative. Explain your answer (No formal proof necessary).