

**Math 429 Fall 2005**  
**Assignment 3: Due by Sept 26th**

1. Let  $V$  be a finite dimensional vector space over field  $\mathbb{F}$  and  $W$  be a subspace of  $V$ . Show if  $W$  has the same dimension with  $V$ , then  $W = V$ .
2. (1) (Page 55, Problem 3) Let  $\{\alpha_1, \alpha_2, \alpha_3\}$  be the ordered basis for  $\mathbb{R}^3$  consisting of

$$\alpha_1 = (1, 0, 1), \alpha_2 = (1, 1, 1), \alpha_3 = (1, 0, 0).$$

What are the coordinates of the vector  $(a, b, c)$  in the given ordered basis ?

- (2) Consider the standard ordered basis  $\{e_1, e_2, e_3\}$  of  $\mathbb{R}^3$ . Find the coordinate transition matrix from the coordinate with basis  $\{\alpha_1, \alpha_2, \alpha_3\}$  to the coordinate with basis  $\{e_1, e_2, e_3\}$ .
3. Let  $S$  be the row space of the following matrix over  $\mathbb{R}$

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 3 & 2 & 1 & 1 & -3 \\ 0 & 1 & 2 & 2 & 6 \\ 5 & 4 & 3 & 3 & -1 \end{pmatrix}.$$

Find a basis of  $S$ .