

MATH 23a, FALL 2001  
THEORETICAL LINEAR ALGEBRA  
AND MULTIVARIABLE CALCULUS  
Quiz # 1  
October 10, 2001

1. True or False

**T** or **F** If  $V$  is a vector space with  $\dim(V) = n$ , then any  $n$  vectors form a basis for  $V$ .

**T** or **F** If  $V$  is a finite-dimensional vector space, then any subspace is also finite-dimensional.

2. Let  $V$  be a vector space over a field  $F$ . Define what it means for the set of vectors  $\{\mathbf{v}_1, \dots, \mathbf{v}_n\}$  to be *linearly independent*.

3. Consider the linear map  $L : \mathbb{R}^3 \longrightarrow C[0, 1]$  defined by

$$L(a, b, c) = a \cdot 1 + b \cdot x + c \cdot (1 - x)$$

(a) Find the kernel  $K$  of  $L$ .

(b) What is the dimension of  $\mathbb{R}^3/K$ ?

(c) Find a set of vectors (cosets) which spans  $\mathbb{R}^3/K$ .