Student Name:______________________________ Student Number: _______________ Serial No.:______

Instructor: M. Z. Abu-Sbeih Math - 260.1 Quiz No. 3 Date: 11-8-2009.

Show all your work. No credits for answers without work.

Problem 1: Determine if the following set of vectors is linearly dependent or independent in $\mathbb{R}^3$.

$S_1 = \{(1,2,3), (2,3,1), (3,1,2)\}$. Can you write the vector $\vec{v} = (3,3,3)$ as a linear combination of these vectors? If yes show how.

Problem 2: Determine if the following sets form subspaces of $\mathbb{R}^2$. Show why.

(a) $V_1 = \{(x, x^2) : x \in \mathbb{R}\}$

(b) $V_2 = \{(2x, -x) : x \in \mathbb{R}\}$

Problem 3: Identify each of the following statements as true or false.

(a) Any set of more than 5 vectors is linearly independent in $\mathbb{R}^5$.
(b) Any set of 5 linearly independent vectors in $\mathbb{R}^5$ form a basis.
(c) A minimal spanning set of vectors form a basis.
(d) Any set containing the zero vector is linearly dependent.
(e) If the system $A\vec{X} = \vec{0}$ has only one solution then the dimension of the solution space is 1.
(f) A set of vectors is linearly independent if one of them can be written as a linear combination of the other vectors.
(g) Any two spanning sets of a vector space must have the same number of elements.

Problem 4: find a basis for the solution space of the system $A\vec{X} = \vec{0}$, where

$$A = \begin{bmatrix} 1 & -2 & 3 & 1 \\ 2 & 1 & -1 & 2 \\ 3 & -1 & 2 & 3 \\ 1 & 3 & -4 & 1 \end{bmatrix}$$