

MATH 54 (Ribet), S215

Quiz 4, February 21, 2007

Name: _____

PROBLEM ONE [4 PTS.]

- (a) [1 pt.] If V is the space of vectors (x, y, z) in 3-space satisfying $x = y = z$, what is $\dim V$? _____
- (b) [2 pts.] True or false: the one-element set $\{0\}$ is a basis for the zero-dimensional vector space 0 . _____
- (c) [1 pt.] True or false: a set of vectors containing $\mathbf{0}$ can be linearly independent. _____

PROBLEM TWO [4 PTS.]

The standard basis for \mathbb{R}^2 consists of $e_1 = \langle 1, 0 \rangle$ and $e_2 = \langle 0, 1 \rangle$.

A second basis for \mathbb{R}^2 consists of $d_1 = \langle 1, 1 \rangle$ and $d_2 = \langle 1, -1 \rangle$.

Write the vector $d_1 - d_2$ in terms of the basis $\{e_1, e_2\}$.

Write the vector $2e_1$ in terms of the basis $\{d_1, d_2\}$.

PROBLEM THREE [5 PTS.]

The matrix A is given below. Find the row-equivalent REF matrix U [1 pt.]. Give a basis for each of: $RS(A)$, $NS(A)$, $CS(A)$. [4 pts.] (Hint: for $CS(A)$, theorem 3.76 says that the columns of A which have pivots in U form a basis.)

$$\begin{bmatrix} 1 & -1 & -1 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & -3 & -2 & -1 \\ 2 & -2 & -1 & 0 \end{bmatrix}$$