

## V63.0140-3: Linear Algebra. QUIZ 1

Tues 9/16/03. Please answer on this sheet. Your NAME:

1. Solve this system of linear equations using reduction of the augmented matrix to reduced echelon form:

$$\begin{array}{rccccrcr} & & & & 3x_3 + & x_4 & = & 1 \\ 2x_1 + & 6x_2 + & x_3 - & 2x_4 & = & 15 \\ -x_1 - & 3x_2 + & 2x_3 + & x_4 & = & -5 \end{array}$$

If consistent, write the general solution:

$$x_1 =$$

$$x_2 =$$

$$x_3 =$$

$$x_4 =$$

Otherwise, if not consistent, explain why.

2. (a) Is the matrix  $\begin{bmatrix} 1 & 0 & 3 & 0 \\ 1 & 0 & -1 & 0 \\ 0 & 1 & 2 & 0 \end{bmatrix}$  in echelon form or reduced echelon form?

(b) True or false: Whenever a system has free variables, the solution set contains many solutions? (Very briefly explain your answer)

(c) Is it possible to multiply a 5-by-3 matrix by a length 3 vector? If so, what size object results? If not, what vector *could* be multiplied by this matrix?

3. Can the vector  $\begin{bmatrix} -1 \\ -4 \\ -9 \end{bmatrix}$  be written as a linear combination of the vectors  $\begin{bmatrix} 1 \\ 3 \\ 5 \end{bmatrix}$ ,  $\begin{bmatrix} 0 \\ -1 \\ 2 \end{bmatrix}$ , and  $\begin{bmatrix} 2 \\ 5 \\ 12 \end{bmatrix}$ ?

Do these 3 latter vectors span  $\mathbb{R}^3$  ? Why?