

LAST NAME: SOLUTIONS

FIRST NAME: _____

STUDENT NUMBER: _____

QUIZ 1 (A)

DAWSON COLLEGE

201-NYC-05-S2 Linear Algebra

Instructor: E. Richer

Date: June 12th 2008

Question 1. (5 marks)

Determine which of the following matrices are in row echelon form, or in reduced row echelon form:

$$A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 2 \\ 1 & 0 \\ 0 & 0 \end{bmatrix} \quad C = \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 0 & 0 \end{bmatrix} \quad D = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix} \quad E = \begin{bmatrix} 1 & 0 & 1 \\ 0 & -1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

The following matrix (matrices) is (are) in **row echelon** form: C D

The following matrix (matrices) is (are) in **reduced row echelon** form: C D

Question 2. (5 marks)

Find the solution set of the linear equation $3x - 6y + 2z = -6$

$$\text{Let } y = s$$

$$z = t$$

$$3x = -6 + 6y - 2z$$

$$x = -2 + 2y - \frac{2}{3}z$$

$$= -2 + 2s - \frac{2}{3}t$$

SOLUTION set is

$$(x, y, z) = (-2 + 2s - \frac{2}{3}t, s, t) \quad s, t \text{ in } \mathbb{R}$$

Question 3. (5 marks)

Find the solution set of the system of linear equations whose augmented matrix is given below in row echelon form.

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

$$x_3 = -3$$

$$x_2 - x_3 = 1$$

$$x_2 = 1 + x_3$$

$$= 1 - 3$$

$$= -2$$

$$x_1 + x_2 - x_3 = 0$$

$$x_1 = -x_2 + x_3$$

$$= -(-2) - 3$$

$$= -1$$

SOLUTION set is

$$(x_1, x_2, x_3) = (-1, -2, -3)$$

Question 4. (5 marks)

Find the solution set of the following system of linear equations.

$$x_1 - 2x_2 - x_3 = 0$$

$$x_2 + 3x_4 = 0$$

Augmented matrix

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

Free variables x_3, x_4

Let $x_3 = s$

$$x_4 = t$$

$$x_2 = -3x_4$$

$$x_2 = -3t$$

$$x_1 - 2x_2 - x_3 = 0$$

$$x_1 = 2x_2 + x_3$$

$$= 2(-3t) + s$$

$$= -6t + s$$

Solution set is

$$(x_1, x_2, x_3, x_4) = (-6t + s, -3t, s, t)$$

s, t in \mathbb{R}

