Dawson College: **Linear Algebra**: 201-105-DW Section 05

February 23, 2009

Name: SOLUTIONS

Student ID: _____

Quiz 4

Question 1. *(3 marks)* Find an elementary matrix E such that $EA = B$ if:

$$A = \begin{bmatrix} 2 & 5 & 3 \\ 1 & 0 & -1 \\ 0 & -1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 4 & 5 & 1 \\ 1 & 0 & -1 \\ 0 & -1 & 1 \end{bmatrix}$$

$A \xrightarrow{R_1 + 2R_2} B \implies E = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Question 2. *(4 marks)* Find A^{-1} if possible given:

$$A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 5 & -3 \\ 1 & 3 & -3 \end{bmatrix}$$

$$\left[\begin{array}{ccc|ccc} 1 & 2 & 0 & 1 & 0 & 0 \\ 2 & 5 & -3 & 0 & 1 & 0 \\ 1 & 3 & -3 & 0 & 0 & 1 \end{array}\right] \xrightarrow[R_3 - R_1]{R_2 - 2R_1} \left[\begin{array}{ccc|ccc} 1 & 2 & 0 & 1 & 0 & 0 \\ 0 & 1 & -3 & -2 & 1 & 0 \\ 0 & 1 & -3 & -1 & 0 & 1 \end{array}\right]$$

$$\xrightarrow{-R_2} \left[\begin{array}{ccc|ccc} 1 & 2 & 0 & 1 & 0 & 0 \\ 0 & 1 & -3 & -2 & 1 & 0 \\ 0 & 0 & 0 & 1 & -1 & 1 \end{array}\right] \xrightarrow{R_1 - 2R_2} \left[\begin{array}{ccc|ccc} 1 & 0 & 6 & 5 & -2 & 0 \\ 0 & 1 & -3 & -2 & 1 & 0 \\ 0 & 0 & 0 & 1 & -1 & 1 \end{array}\right]$$

$\neq I$

A IS NOT INVERTABLE

Question 3. *(3 marks)* Write the following system of equations as a single matrix equation ($Ax = b$):

$$\begin{array}{rcrcrcr} x_1 & + & 3x_2 & + & x_3 & = & 4 \\ 2x_1 & + & 2x_2 & + & x_3 & = & -1 \\ 2x_1 & + & 3x_2 & + & x_3 & = & 3 \end{array}$$

$$\begin{bmatrix} 1 & 3 & 1 \\ 2 & 2 & 1 \\ 2 & 3 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 4 \\ -1 \\ 3 \end{bmatrix}$$