Linear Algebra
Quiz 1

Name:_____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Consider the system

$$\begin{array}{rrrcr} x_1 & +2x_2 & +3x_3 & = & 0 \\ x_1 & +3x_2 & +2x_3 & = & 2 \\ 2x_1 & +3x_2 & +7x_3 & = & -2 \end{array}$$

(a) Write down the augmented matrix of the system and then put it in row echelon form.

$$\left[\begin{array}{rrr|r} 1 & 2 & 3 & 0 \\ 1 & 3 & 2 & 2 \\ 2 & 3 & 7 & -2 \end{array}\right] \longrightarrow \left[\begin{array}{rrr|r} 1 & 2 & 3 & 0 \\ 0 & 1 & -1 & 2 \\ 0 & 0 & 0 & 0 \end{array}\right]_{GE} \quad \text{or} \quad \left[\begin{array}{rrr|r} 1 & 0 & 5 & -4 \\ 0 & 1 & -1 & 2 \\ 0 & 0 & 0 & 0 \end{array}\right]_{GJE}$$

(b) What is the general solution to the system?

$$x_3 = x_3, \quad x_2 = 2 + x_3, \quad x_1 = -4 - 5x_3$$

2.

(a) Write down the elementary matrix E that has the property that, for each $3 \times n$ matrix A, EA is the matrix obtained from A by switching its first and last rows.

$$E = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

(b) Write down the elementary matrix E that has the property that, for each $3 \times n$ matrix A, EA is the matrix obtained from A by adding twice the middle row of A to the first row of A.

$$E = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$