Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 4 (A)

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

$$A = \begin{bmatrix} 3 & 3 & 3 \\ 2 & -1 & -1 \\ 4 & 1 & 1 \end{bmatrix}$$

$$[A\,|\,I] = \left[\begin{array}{ccc|ccc} 3 & 3 & 3 & 1 & 0 & 0 \\ 2 & -1 & -1 & 0 & 1 & 0 \\ 4 & 1 & 1 & 0 & 0 & 1 \end{array}\right] \xrightarrow{R_1 \cdot 1/3}$$

$$\left[\begin{array}{ccc|ccc} 1 & 1 & 1 & 1/3 & 0 & 0 \\ 2 & -1 & -1 & 0 & 1 & 0 \\ 4 & 1 & 1 & 0 & 0 & 1 \end{array}\right] \begin{matrix} \xrightarrow{R_2 - 2R_1} \\ \xrightarrow{R_3 - 4R_1} \end{matrix} \left[\begin{array}{ccc|ccc} 1 & 1 & 1 & 1/3 & 0 & 0 \\ 0 & -3 & -3 & -2/3 & 1 & 0 \\ 0 & -3 & -3 & -4/3 & 0 & 1 \end{array}\right] \xrightarrow{R_3 - R_2}$$

$$\left[\begin{array}{ccc|ccc} 1 & 1 & 1 & 1/3 & 0 & 0 \\ 0 & -3 & -3 & -2/3 & 1 & 0 \\ 0 & 0 & 0 & -2/3 & -1 & 1 \end{array}\right] \leftarrow$$

A IS NOT INVERTABLE SINCE ITS RREF CANNOT BE I

Question 2. *(3 marks)* Find a matrix B such that

$$B^{-3} = \begin{bmatrix} 64 & 0 & 0 \\ 0 & -8 & 0 \\ 0 & 0 & 1 \end{bmatrix} \Rightarrow B = \begin{bmatrix} 1/4 & 0 & 0 \\ 0 & -1/2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Question 3. *(3 marks)* Find conditions that b_1 and b_2 must satisfy in order for the system to be consistent.

$$\begin{aligned} 8x_1 - 6x_2 &= b_1 \\ 4x_1 - 3x_2 &= b_2 \end{aligned}$$

AUGMENTED MATRIX:

$$\left[\begin{array}{cc|c} 8 & -6 & b_1 \\ 4 & -3 & b_2 \end{array}\right] \xrightarrow{R_1 \cdot 1/8} \left[\begin{array}{cc|c} 1 & -3/4 & b_1/8 \\ 4 & -3 & b_2 \end{array}\right] \xrightarrow{R_2 - 4R_1}$$

$$\left[\begin{array}{cc|c} 1 & -3/4 & b_1/8 \\ 0 & 0 & b_2 - b_1/2 \end{array}\right]$$

$\therefore b_2 - b_1/2 = 0$

OR

$2b_2 = b_1$