Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 3 (B)

Question 1. *(4 marks)* Use the given information to find A:

$$(3I+2A^T)^{-1} = \begin{bmatrix} 2 & 2 \\ 3 & 4 \end{bmatrix}$$

$$\left((3I+2A^T)^{-1}\right)^{-1} = \begin{bmatrix} 2 & 2 \\ 3 & 4 \end{bmatrix}^{-1}$$

$$3I+2A^T = \frac{1}{8-6}\begin{bmatrix} 4 & -2 \\ -3 & 2 \end{bmatrix}$$

$$3I+2A^T = \begin{bmatrix} 2 & -1 \\ -\frac{3}{2} & 1 \end{bmatrix}$$

$$2A^T = \begin{bmatrix} 2 & -1 \\ -\frac{3}{2} & 1 \end{bmatrix} - 3\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$2A^T = \begin{bmatrix} -1 & -1 \\ -\frac{3}{2} & -2 \end{bmatrix}$$

$$A^T = \frac{1}{2}\begin{bmatrix} -1 & -1 \\ -3/2 & -2 \end{bmatrix}$$

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

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

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

Question 2. *(4 marks)* Circle the elementary matrices. For each elementary matrix state the corresponding operation.

$$\begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} \qquad R_1 \leftrightarrow R_2$$

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad R_1 + R_4$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 2 & 0 & 2 \end{bmatrix} \qquad \begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

Question 3. *(2 marks)* Find a nonzero 3×3 matrix such that $A^T = -A$.

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

(OR ANY MATRIX OF THE TYPE $\begin{bmatrix} 0 & x & y \\ -x & 0 & z \\ -y & -z & 0 \end{bmatrix}$)