MATH 2050 **Assignment 7** **Fall 2018**

Due: Thursday, Nov. 8

[7] 1. Find the inverse of A and then solve the system is $A\mathbf{x} = \mathbf{b}$, where $A = \begin{bmatrix} 0 & 1 & -1 \\ 1 & 2 & 1 \\ 1 & 0 & 1 \end{bmatrix}$, $\mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$, and $\mathbf{b} = \begin{bmatrix} 8 \\ 5 \\ -7 \end{bmatrix}$.

[5] 2. Determine if A is invertible and if so find A^{-1}:

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

[3] 3. Which of the following matrices are elementary matrices, explain why.

(a) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 & 0 \\ -2 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

[8] 4. Let $A = \begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 2 \\ 2 & 4 \end{bmatrix}$, and $C = \begin{bmatrix} 4 & -2 \\ -6 & 3 \end{bmatrix}$. Solve each of the following matrix equations:

(a) $AX + B = C$

(b) $XA + C = X$

[6] 5. For each of the following pairs of matrices, find an elementary matrix E such that $EA = B$.

(a) $A = \begin{bmatrix} -9 & -1 \\ 5 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -4 & 2 \\ 5 & 3 \end{bmatrix}$.

(b) $A = \begin{bmatrix} 2 & 1 & 3 \\ -2 & 4 & 5 \\ 3 & 1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 & 3 \\ 3 & 1 & 4 \\ -2 & 4 & 5 \end{bmatrix}$

(c) $A = \begin{bmatrix} 4 & -2 & 3 \\ 1 & 0 & 2 \\ -2 & 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 4 & -2 & 3 \\ 1 & 0 & 2 \\ 0 & 3 & 5 \end{bmatrix}$

[8] 6. Let $A = \begin{bmatrix} 0 & -1 \\ 2 & 1 \end{bmatrix}$.

(a) Express A as a product of elementary matrices.

(b) Express A^{-1} as a product of elementary matrices.

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