## MEMORIAL UNIVERSITY OF NEWFOUNDLAND DEPARTMENT OF MATHEMATICS AND STATISTICS

Assignment 5

## MATH 2050 DUE: FRIDAY OCTOBER 19

1. Find the inverse of each of the following matrices or explain why it is not possible.

$$A = \begin{bmatrix} 10 & 20 \\ 2 & 4 \end{bmatrix}, \qquad B = \begin{bmatrix} 10 & 20 \\ 5 & 4 \end{bmatrix}, \qquad C = \begin{bmatrix} 3 & -5 & 1 \\ 5 & -10 & 5 \\ 2 & 0 & -1 \end{bmatrix},$$
$$D = \begin{bmatrix} -2 & 1 & 3 \\ -3 & 1 & 2 \\ -4 & 2 & 1 \end{bmatrix}, \qquad F = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ 2 & 2 & 2 \end{bmatrix}, \qquad G = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 3 & 3 & 3 \end{bmatrix}.$$

2. Solve the system of equations by writing it in the form AX = B and finding  $A^{-1}$ . Check your answer.

Hint: you can use your result obtained in problem 1 if appropriate.

(a) 
$$\begin{cases} 2x - 5y = -14 \\ -x + 2y = 5 \end{cases}$$
  
(b) 
$$\begin{cases} -2x + 13y = 24 \\ 11x + 23y = 35 \end{cases}$$
  
(c) 
$$\begin{cases} -2x + y + 3z = -1 \\ -3x + y + 2z = -3 \\ -4x + 2y + 1z = -2 \end{cases}$$
  
(d) 
$$\begin{cases} -2x + y + 3z = 1 \\ -3x + y + 2z = -1 \\ -4x + 2y + 1z = -3 \end{cases}$$

3. Explain why each of the following matrices is elementary. Find its inverse in the easy way.

	1	0	0	0	0	]	1	0	0	0	0	]	[1	0	0	0	$0 \neg$	
	0	0	0	1	0		0	$2^k$	0	0	0		0	1	0	0	-5	
A =	0	0	1	0	0	, B =	0	0	1	0	0	, C =	0	0	1	0	0	.
	0	1	0	0	0		0	0	0	1	0		0	0	0	1	0	l
	0	0	0	0	1		0	0	0	0	1		0	0	0	0	1	

- 4. Explain in your words, using the definition of inverse matrix and/or examples of your choice, why each of the following statements is true.
  - a) If a matrix has an inverse then it must be a square matrix.
  - b) Not any square matrix is invertable.
  - c) Every elementary matrix is invertable.

d) If matrix A is invertable then the system AX = B has a unique solution for any vector-column B.