MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 5 **MATH 2050 sect. 3** DUE: FRIDAY OCT 20

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1. Which of the following pairs of matrices are inverses of each other?

$$a) \qquad A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \quad B = \frac{1}{2}\begin{bmatrix} -4 & 2 & 1 \\ 3 & -1 & 0 \end{bmatrix}.$$

$$b) \qquad A = \begin{bmatrix} 0 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}, \quad B = \frac{1}{3}\begin{bmatrix} -3 & 6 & -3 \\ 6 & -21 & 12 \\ -3 & 14 & -8 \end{bmatrix}.$$

$$c) \qquad A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}.$$

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

(a) $\begin{cases} 4x + 7y = 2 \\ x + 2y = -1 \end{cases}$

(b) $\begin{cases} x - 2y + 2z = 3 \\ x + z = -2 \\ 2x + y + z = 0 \end{cases}$

(c) $\begin{cases} y - z = 8 \\ x + 2y + z = 5 \\ x + z = -7 \end{cases}$

3. Show that for any invertable square matrices A and B the following is true

$$((AB)^T)^{-1} = (A^T)^{-1}(B^T)^{-1}.$$

4. Let A be a symmetric $n \times n$-matrix, and X, Y be matrices of the size $n \times 1$ and $1 \times n$ respectively. Show that

$$(YAX)^{-1} = (X^T A Y^T)^{-1}.$$