MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 4 **MATH 2050 sect. 3** DUE: FRIDAY OCT 6

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1. Find matrix A if
$$4A - \begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} -3 & 2 \\ -1 & 7 \end{bmatrix} - 2A.$$

2. A square matrix B is called **skew-symmetric** if $B^T = -B$. Let A be a square matrix. Show that $B = A - A^T$ is skew-symmetric.

3. Consited matrices
$$A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 0 & 0 & 2 & 1 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 2 & -3 & 1 & 5 \\ -1 & 0 & 2 & 1 & 4 \end{bmatrix}, \quad C = \begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix}.$$
Find the following products if they are defined
$$AB, \quad AC, \quad CA, \quad AB^T, \quad A^TB, \quad A^2, \quad B^2, \quad C^2$$

4. The **trace** of a square matrix A, denoted tr$A$, is the sum of the elements on the main diagonal of A. Show that if A and B are $n \times n$ matrices then
$$\mathrm{trA^T = trA, \quad tr(A+B) = trA + trB, \quad tr(AB) = tr(BA).}$$

5. Write the following system of linear equations in the form $AX = B$
$$x_1 - x_2 + 3x_3 = 4, \quad x_2 + 10x_3 = -4, \quad 20x_1 - x_3 = 0 \quad , x_4 = 1,$$
namely, identify matrices A, X, B and their dimentions.

6. Given agmented matrix of coefficients of a homogeneous system find the basic solutions and write the parametric solution in the vector form
$$\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 1 \\ 0 & 0 & 2 & -6 & 4 & 2 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

7. Compose a word problem whose solution leads to matrix multiplication.