## MEMORIAL UNIVERSITY OF NEWFOUNDLAND DEPARTMENT OF MATHEMATICS AND STATISTICS

Assignment 4	MATH 2050 Sec.3	DUE: FRIDAY,	Oct.
ASSIGNMENT 4	MAIN 2000 Sec.3	DUE: FRIDAY,	OCT.

1. Consider augmented matrix for a homogeneous system of linear equations.

1.1 Rewrite the problem in the matrix form AX = B (identify matrices A, X and B, and their dimensions).

(b)

1.2 Find the basic solutions and write the parametric solution in the **vector form**.

- (a)
- $\begin{bmatrix} 1 & 3 & -1 & 4 & 1 & 5 & | & 0 \\ 0 & 0 & 1 & 3 & 2 & 4 & | & 0 \\ 0 & 0 & 0 & 0 & 5 & 15 & | & 0 \\ 0 & 0 & 0 & 0 & 0 & | & 0 \end{bmatrix} \begin{bmatrix} 1 & 3 & -1 & 4 & 1 & | & 0 \\ 2 & 6 & -2 & 3 & 2 & | & 0 \\ 0 & 0 & 0 & 0 & 0 & | & 0 \end{bmatrix}$
- 2. Write the system of linear equations  $\begin{cases} 5x_2 2x_6 1 = 0\\ 2x_1 + 17x_4 + 10 = 0 & \text{in the form } AX = B,\\ 20x_3 + x_5 6 = 0 & \text{in the form } AX = B, \end{cases}$

namely, identify matrices A, X, B and their dimensions. Find the parametric solution and write it in the **vector form**.

3. Find matrix A if

$$3\begin{bmatrix} 1 & 1 & 0 \\ 1 & 4 & -2 \end{bmatrix}^{T} + 2A = \begin{bmatrix} -2 & 1 \\ -1 & 7 \\ 0 & 5 \end{bmatrix}.$$

## 4. Give a **definition** and an **example** of each:

(a) diagonal matrix, (b) non-square matrix, (c) symmetric matrix, (d) skew-symmetric matrix, (e) idempotent matrix, (f) identity marix.

5. Let A, B be symmetric matrices, and C, D skew-symmetric matrices. Determine if the following is symmetric, skew symmetric or neither:

$$A+B$$
,  $A+C$ ,  $D+C$ ,  $A+B+C$ ,  $AB$ ,  $AC$ ,  $CD$ ,  $C+C^T$ 

6. Consider matrices

$$A = \begin{bmatrix} 0 & 2 & 3 \\ 1 & 0 & 2 \\ 1 & 0 & -1 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 2 & -3 \\ -1 & 0 & 2 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 2 & 0 \end{bmatrix}.$$

Find the following products if they are defined

$$BA, \quad AC^TA, \quad A^TB^T, \quad A^TB, \quad A^2, \quad B^2, \quad C^2$$

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