# MEMORIAL UNIVERSITY OF NEWFOUNDLAND <br> DEPARTMENT OF MATHEMATICS AND STATISTICS 

Assignment 4
MATH 2050 Sec. 3
Due: Friday, Oct. 5

1. Consider augmented matrix for a homogeneous system of linear equations.
1.1 Rewrite the problem in the matrix form $A X=B$ (identify matrices $A, X$ and $B$, and their dimentions).
1.2 Find the basic solutions and write the parametric solution in the vector form.
(a)

$$
\left[\begin{array}{cccccc|c}
1 & 3 & -1 & 4 & 1 & 5 & 0 \\
0 & 0 & 1 & 3 & 2 & 4 & 0 \\
0 & 0 & 0 & 0 & 5 & 15 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0
\end{array}\right]
$$

(b)

$$
\left[\begin{array}{ccccc|c}
1 & 3 & -1 & 4 & 1 & 0 \\
2 & 6 & -2 & 3 & 2 & 0 \\
0 & 0 & 0 & 0 & 0 & 0
\end{array}\right]
$$

2. Write the system of linear equations $\left\{\begin{array}{l}5 x_{2}-2 x_{6}-1=0 \\ 2 x_{1}+17 x_{4}+10=0 \\ 20 x_{3}+x_{5}-6=0\end{array}\right.$ in the form $A X=B$, namely, identify matrices $A, X, B$ and their dimentions. Find the parametric solution and write it in the vector form.
3. Find matrix $A$ if

$$
3\left[\begin{array}{ccc}
1 & 1 & 0 \\
1 & 4 & -2
\end{array}\right]^{T}+2 A=\left[\begin{array}{cc}
-2 & 1 \\
-1 & 7 \\
0 & 5
\end{array}\right]
$$

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:

$$
A+B, \quad A+C, \quad D+C, \quad A+B+C, \quad A B, \quad A C, \quad C D, \quad C+C^{T} .
$$

6. Consider matrices

$$
A=\left[\begin{array}{ccc}
0 & 2 & 3 \\
1 & 0 & 2 \\
1 & 0 & -1
\end{array}\right], \quad B=\left[\begin{array}{ccc}
0 & 2 & -3 \\
-1 & 0 & 2
\end{array}\right], \quad C=\left[\begin{array}{lll}
1 & 2 & 0
\end{array}\right] .
$$

Find the following products if they are defined

$$
B A, \quad A C^{T} A, \quad A^{T} B^{T}, \quad A^{T} B, \quad A^{2}, \quad B^{2}, \quad C^{2}
$$

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