NORTH SOUTH UNIVERSITY

DEPARTMENT OF MATHEMATICS & PHYSICS

FALL 2019

ASSIGNMENT # 01

INTRODUCTION TO LINEAR ALGEBRA

MAT 125 SECTION 7, 8

DUE DATE: OCTOBER 29, 2019

Submitted by:

Name:
ID#:
Serial #:
Email:
Name of the Department:
Date of Submission:

Submitted to:

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Number of problems given in the assignment: 18 Problems given in the class (different sheet)

Number of solved problems:

N.B.:

1. Please use **A4** size papers and add this sheet as a cover page
2. Assignment will not be **accepted** after the due date
3. Your score will be **zero** for any copy or plagiarism

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SHOW ALL THE WORK.

Solve the following linear system of equations using Gaussian Elimination method (1-3):

1. $\begin{aligned} x+y+2z &= 4 \\ 2x+3y+6z &= 10 \\ 3x+6y+10z &= 14 \end{aligned}$

2. $\begin{aligned} x+2y+3z &= 3 \\ 2x+3y+8z &= 4 \\ 5x+8y+19z &= 11 \end{aligned}$

3. $\begin{aligned} x_1-x_2+x_3-x_4+x_5 &= 1 \\ 2x_1-x_2+3x_3+4x_5 &= 2 \\ 3x_1-2x_2+2x_3+x_4+x_5 &= 1 \\ x_1+x_3+2x_4+x_5 &= 0 \end{aligned}$

Solve the following linear system of equations using Gauss-Jordan Elimination method (4-6):

4. $\begin{aligned} x-2y+3z &= 2 \\ 2x-3y+8z &= 7 \\ 3x-4y+13z &= 8 \end{aligned}$

5. $\begin{aligned} x+2y-3z &= 4 \\ x+3y+z &= 11 \\ 2x+5y-4z &= 13 \\ 2x+6y+2z &= 22 \end{aligned}$

6. $\begin{aligned} 10x_2 - 4x_3 + x_4 &= 1 \\ x_1+4x_2 - x_3 + x_4 &= 2 \\ 3x_1+2x_2 + x_3+2x_4 &= 5 \\ -3x_1-8x_2+2x_3-2x_4 &= -4 \\ x_1-6x_2+3x_3 &= 1 \end{aligned}$

Find the conditions on a, b and c so that the following linear systems of equations have a solution (7-9):

7. $\begin{aligned} -2x+y+z &= a \\ x-2y+z &= b \\ x+y-2z &= c \end{aligned}$

8. $\begin{aligned} x+y+2z &= a \\ x+z &= b \\ 2x+y+3z &= c \end{aligned}$

9. $\begin{aligned} x+2y-3z &= a \\ 2x+6y-11z &= b \\ 2x-4y+14z &= 2c \end{aligned}$

Hence solve the above problems.

Solve the following linear system of equations using Cramer's Rule (10-12):

10. $\begin{aligned} x+y+z &= 6 \\ 2x+3y+4z &= 20 \\ 3x-2y+z &= 2 \end{aligned}$

11. $\begin{aligned} x+2y+3z &= 5 \\ 2x-y+z &= 5 \\ 4x+2y-3z &= 5 \end{aligned}$

12. $\begin{aligned} x+y+z-2t &= -4 \\ x-2y+3z+4t &= 10 \\ 2x+3y-z+2t &= 9 \\ 4x-y+2z-t &= -7 \end{aligned}$

Find the inverse using row reduction and verify your answer for the following matrices (13-15):

13. $C = \begin{pmatrix} 3 & 4 & -1 \\ 1 & 0 & 3 \\ 2 & 1 & -4 \end{pmatrix}$

14. $B = \begin{pmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ 4 & 1 & 8 \end{pmatrix}$

15. $A = \begin{pmatrix} 2 & 5 & 3 \\ 1 & 0 & 8 \\ 1 & 2 & 3 \end{pmatrix}$

Solve the following linear system of equations using Inverse matrix method (16-18):

16.
$$\begin{aligned} x + y + z &= 6 \\ 2x + 3y + 4z &= 20 \\ 3x - 2y + z &= 2 \end{aligned}$$

17.
$$\begin{aligned} x + y + z - 2t &= -4 \\ x - 2y + 3z + 4t &= 10 \\ 2x + 3y - z + 2t &= 9 \\ 4x - y + 2z - t &= -7 \end{aligned}$$

18.
$$\begin{aligned} x + 2y + 3z &= 5 \\ 2x + 5y + 3z &= 3 \\ x \quad\quad + 8z &= 17 \end{aligned}$$