Math 1310 – Technical Math for IT

Name:			

ASSIGNMENT 7

Set:

Due: Dec 1st, 11:59 PM, online submission, one pdf file

This is how I mark this assignment:

50 percent: I scan all the questions to see if they are solved or not. 50 percent: I select one or two randomly and mark them in details.

Question 1: (10 marks) Solve the linear system:

For x, y and z using

- (a) the Gauss-Jordan method. Be sure to show which row operation you are performing at each step.
- (b) Cramer's Rule

$$\alpha) 2x - y + 62 = 10$$

$$-3x + 4y - 52 = 11$$

$$8x - 7y - 92 = 12$$

$$\begin{bmatrix} 2 & -1 & 6 & | & 10 \\ -3 & 4 & -5 & | & 11 \\ 8 & -7 & -9 & | & 12 \end{bmatrix} \xrightarrow{12} \begin{bmatrix} 1 & -1/2 & 3 & | & 5 \\ -3 & 4 & -5 & | & 11 \\ 8 & -7 & -9 & | & 12 \end{bmatrix}$$

$$\frac{3R_1 + R_2 = > R_1}{8R_1 + R_3 = > R_3} \begin{bmatrix} 1 & -1/2 & 3 & | & 5 \\ 0 & 5/2 & 4 & | & 36 \\ 0 & -3 & -33 & | & -28 \end{bmatrix} \xrightarrow{2/5} \frac{R_2}{8R_3} = > \frac{1 - 1/2}{2} \xrightarrow{3} \frac{3}{1} \xrightarrow{5} \frac{5}{5} = \frac{1}{1} = \frac{1$$

$$\frac{1}{2}R_{1} + R_{1} = 7R, \quad 0 \quad 10/5 \mid 51/5 \mid \frac{51}{5} \mid \frac{51}$$

Math 1310 - Technical Math for IT

b)
$$A = \begin{bmatrix} 2 & -1 & 6 \\ -3 & 4 & -5 \\ 8 & -7 & -9 \end{bmatrix}, x = \begin{bmatrix} x \\ y \end{bmatrix}, B = \begin{bmatrix} 10 \\ 11 \\ 12 \end{bmatrix}$$
 $X = \frac{A_1}{A}, y = \frac{A_3}{A}, z = \frac{A_3}{A}$
 $A = \begin{bmatrix} 2 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 10 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 2 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 2 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 2 & 4 & 4 \\ -3 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 2 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}$

$$A = \begin{bmatrix} 10 & 4 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}, A = \begin{bmatrix} 140 & 4 & 4 \\ -141 & 4 & 4 \end{bmatrix}$$

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$$A = \begin{bmatrix} 1$$

Question 2: (8 marks)

Given the matrix

 $\Box 1 \ 2 \ 3 \Box$

 $A = \square \square 2 3 4 \square \square$

- (a) Determine the inverse matrix A-1.
- (b) Confirm that your answer to part (a)

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 1 & 5 & 7 \end{bmatrix}$$

a)
$$[A:I]$$

$$\begin{bmatrix} 1 & 2 & 3 & 1 & 1 & 0 & 0 \\ 2 & 3 & 4 & 1 & 0 & 1 & 0 \\ 1 & 5 & 7 & 1 & 0 & 0 & 1 \end{bmatrix} \xrightarrow{-1R_1 + R_3} \xrightarrow{>} R_2 \begin{bmatrix} 1 & 2 & 3 & 1 & 1 & 0 & 0 \\ 0 & -1 & -2 & 1 & -2 & 1 & 0 \\ 0 & 3 & 4 & 1 & -1 & 0 & 1 \end{bmatrix}$$

$$-1R_{2} = 2R_{2} \begin{bmatrix} 1 & 2 & 3 & | & 1 & 000 \\ 0 & 1 & 2 & | & 2 & -10 \\ 0 & 3 & 4 & | & -10 \end{bmatrix} \xrightarrow{-2R_{2} + R_{1} \Rightarrow R_{3}} \begin{bmatrix} 1 & 0 & -1 & | & -320 \\ 0 & 1 & 2 & | & 2 & -10 \\ 0 & 3 & 4 & | & -10 \end{bmatrix}$$

Question 3: (8 marks)

Solve the following system of linear equations using matrix inverse method

$$2x y + - = 2 \cdot 10z$$

$$y + 10z = -28$$

$$3 \cdot 16y + z = -42$$

$$3) \quad 2x + y - 2z = 10$$

$$y + 10z = -38$$

$$3y + 16z = -42$$

$$4 = \begin{bmatrix} 2 & 1 & -2 \\ 0 & 1 & 10 \\ 0 & 3 & 16 \end{bmatrix}, \quad x = \begin{bmatrix} x \\ y \\ 2 \end{bmatrix}, \quad \mathcal{B} = \begin{bmatrix} 100 \\ -38 \\ -42 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 1 & -2 & 1000 \\ 0 & 3 & 16 & 1001 \end{bmatrix} \xrightarrow{12} \begin{bmatrix} 2 & 1 & 2 & 2 \\ 2 & 2 & 3 \end{bmatrix} \xrightarrow{10} \begin{bmatrix} 2 & 1 & 2 & 2 \\ 2 & 3 & 3 \end{bmatrix} \begin{bmatrix} 2 & 1 & 2 & 3 \\ 2 & 3 & 3 \end{bmatrix} \begin{bmatrix} 2 & 1$$

Question 4: (9 marks)

Determine the values of "a" so that the following system in unknowns x, y and z has

- A unique solution
- (ii) More than one solutions

Also, can you find a value "a" that the system has no solution? Why?

$$xyz++=0$$

$$2 3x + + = y az 0$$

$$x \, ay + + = 3 \, 0z$$

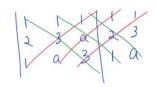
$$x + y + 2 = 0$$

 $2x + 3y + 92 = 0$

$$2x + 3y + 92 = 0$$

$$x + aq + 32 = 0$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & 3 & \alpha \\ 1 & \alpha & 3 \end{bmatrix}, \quad X = \begin{bmatrix} X \\ Y \\ 2 \end{bmatrix}, \quad 3 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

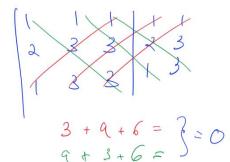


$$9 + a + 2a = 9 + 3q$$

 $3 + a^{2} + 6 = a^{2} + 9$

$$-a^2 + 3a$$

$$a = 0, 3$$



when
$$a = 0, 3$$

 $a + 0 + 0 = 9$ = 0

when
$$a = 0$$
, 3 the determinate is 0 ... when $a \neq 0$, 3 the equation has a unique solution.