



Mohammad Ali Jinnah University

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Quiz 1

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Id: FA19-BSSE-0014

Subject: Linear Algebra (Fall 2020)

Section: AM

Teacher: Dr. Asmat Ara

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Q.1 Solve the following system by Gaussian Jordan method.

$$x + y + 2z = 9$$

$$2x + 4y - 3z = 1$$

$$3x + 6y - 5z = 0$$

Linear Algebra

M. Fahad

FA19-BSEE-004

Date: _____

Quiz #1

Solution (Gaussian Jordan method.)

$$\begin{bmatrix} 1 & 1 & 2 & 9 \\ 2 & 4 & -3 & 1 \\ 3 & 6 & -5 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 2 & 9 \\ 0 & 2 & -7 & -17 \\ 0 & 3 & -11 & -27 \end{bmatrix} \begin{array}{l} -2R_1 + R_2 \\ -3R_1 + R_3 \end{array}$$

$$\begin{bmatrix} 1 & 1 & 2 & 9 \\ 0 & 1 & -7/2 & -17/2 \\ 0 & 3 & -11 & -27 \end{bmatrix} \begin{array}{l} \\ 1/2 R_2 \\ \end{array}$$

$$\begin{bmatrix} 1 & 0 & 11/2 & 35/2 \\ 0 & 1 & -7/2 & -17/2 \\ 0 & 0 & -1/2 & -3/2 \end{bmatrix} \begin{array}{l} -R_2 + R_1 \\ \\ -3R_2 + R_3 \end{array}$$

$$\begin{bmatrix} 1 & 0 & 11/2 & 35/2 \\ 0 & 1 & -7/2 & -17/2 \\ 0 & 0 & 1 & 3 \end{bmatrix} \begin{array}{l} \\ \\ -2R_3 \end{array}$$

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{bmatrix} \begin{array}{l} 7/2 R_3 + R_1 \\ \\ -11/2 R_3 + R_1 \end{array}$$

MIGHTY PAPER PRODUCT

$$\left. \begin{array}{l} x_1 = 1 \\ x_2 = 2 \\ x_3 = 3 \end{array} \right\} \text{Unique Solution.}$$

Consistency Criteria: (Unique Sol)

$$\begin{array}{ccccccc} \text{Rank}(AD) & = & \text{Rank}(A) & = & \text{No of Unknow} \\ 3 & = & 3 & = & 3 \\ & & 3 & = & 3 \end{array}$$

Unique Solution

Ans

Q.2 Solve the following system by Gaussian Elimination method.

$$x - y + 2z = 5$$

$$2x - 2y + 4z = 10$$

$$3x - 3y + 6z = 15$$

Q₂

Solution: (Gausses Elimination)

$$\begin{bmatrix} 1 & -1 & 2 & 5 \\ 2 & -2 & 4 & 10 \\ 3 & -3 & 6 & 15 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -1 & 2 & 5 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \begin{array}{l} -2R_1 + R_2 \\ -3R_1 + R_3 \end{array}$$

$$x_1 - x_2 + 2x_3 = 5$$

$$\text{Let } x_2 = s \text{ and } x_3 = t$$

$$x_1 = x_2 - 2x_3 + 5$$

$$x_1 = s - 2t + 5$$

$$x_2 = s$$

$$x_3 = t$$

Infinite solution

Consistency Criteria: (Infinite sol)

$$\text{Rank}(AD) = \text{Rank}(A) < \text{No of Unknown}$$

$$1 = 1 < 3$$

$$= 1 < 3$$

Infinite Sol.