# School of Science and Technology

Course Code: **MA-210**

Program: **BS(DS)**

Quiz: 1st

Date: 23-10-2023

Course Title: **Linear Argebra**

Total Marks: **20**

Resource Person: **Dr. Muhammad Aziz-ur-Rehman**

Time: 20 **Minutes**

Participant Name: Key ID#: _____ Section **D1**

**Note: - Solve by using (i) Gauss Elimination Method (ii) Gauss Jordan Method**

**Q.No:1.**

$$2x+y+2z=10$$
$$x+3y+z=10$$
$$x-2y-z=-6$$

$$\left[\begin{array}{ccc|c} 2 & 1 & 2 & 10 \\ 1 & 3 & 1 & 10 \\ 1 & -2 & -1 & -6 \end{array}\right]$$

$R_1/2 \to R_1$

$$\left[\begin{array}{ccc|c} 1 & 0.5 & 1 & 5 \\ 1 & 3 & 1 & 10 \\ 1 & -2 & -1 & -6 \end{array}\right]$$

$R_2 - R_1$, $R_3 - R_1$

$$\left[\begin{array}{ccc|c} 1 & 0.5 & 1 & 5 \\ 0 & 2.5 & 0 & 5 \\ 0 & -2.5 & -2 & -11 \end{array}\right]$$

$R_2/2.5$

$$\left[\begin{array}{ccc|c} 1 & 0.5 & 1 & 5 \\ 0 & 1 & 0 & 2 \\ 0 & -2.5 & -2 & -11 \end{array}\right]$$

$R_3 + 2.5(R_2)$

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

$R_3(-\frac{1}{2})$

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

$z = 3$

$x = 2$

$\therefore x + z = 4$

$x = 4 - 2$

$x = 4 - 3$

$x = 1$

$R_1 - 0.5R_2$

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

$\frac{R_3}{-2}$

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

$R_1 - R_3$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{array}\right]$$

$x_1 = 1$

$x_2 = 2$

$x_3 = 3$

matrix by using Row Operations

$$A=\begin{bmatrix}2 & 1 & 4\\ 4 & 11 & -1\\ 8 & -3 & 2\end{bmatrix}$$

$$\left[\begin{array}{ccc|ccc}2 & 1 & 4 & 1 & 0 & 0\\ 4 & 11 & -1 & 0 & 1 & 0\\ 8 & -3 & 2 & 0 & 0 & 1\end{array}\right]$$

$$R_1\left(\tfrac{1}{2}\right)\left[\begin{array}{ccc|ccc}1 & 1/2 & 2 & 1/2 & 0 & 0\\ 4 & 11 & -1 & 0 & 1 & 0\\ 8 & -3 & 2 & 0 & 0 & 1\end{array}\right]$$

$$\begin{matrix}R_2-4R_1\\ R_3-8R_1\end{matrix}\left[\begin{array}{ccc|ccc}1 & 1/2 & 2 & 1/2 & 0 & 0\\ 0 & 9 & -9 & -2 & 1 & 0\\ 0 & -7 & -14 & -4 & 0 & 1\end{array}\right]$$

$$R_2\left(\tfrac{1}{9}\right)\left[\begin{array}{ccc|ccc}1 & 1/2 & 2 & 1/2 & 0 & 0\\ 0 & 1 & -1 & -4/9 & 1/9 & 0\\ 0 & -7 & -14 & -4 & 0 & 1\end{array}\right]$$

$$R_1-\frac{R_2}{2}\left[\begin{array}{ccc|ccc}1 & 0 & 5/2 & 11/18 & -1/18 & 0\\ 0 & 1 & -1 & -2/9 & 1/9 & 0\\ 0 & -7 & -14 & -4 & 0 & 1\end{array}\right]$$

$$R_3+7R_2\left[\begin{array}{ccc|ccc}1 & 0 & 5/2 & 11/18 & -1/18 & 0\\ 0 & 1 & -1 & -2/9 & 1/9 & 0\\ 0 & 0 & -21 & -5\%9 & 7/9 & 1\end{array}\right]$$

$$\frac{-R_3}{21}\left[\begin{array}{ccc|ccc}1 & 0 & 5/2 & 11/18 & -1/18 & 0\\ 0 & 1 & -1 & -2/9 & 1/9 & 0\\ 0 & 0 & 1 & \frac{50}{189} & -1/27 & -1/21\end{array}\right]$$

$$\begin{matrix}R_1-\frac{5R_3}{2}\\ R_2+R_3\end{matrix}\left[\begin{array}{ccc|ccc}1 & 0 & 0 & -19/378 & 1/27 & 5/42\\ 0 & 1 & 0 & -8/189 & 2/27 & -1/27\\ 0 & 0 & 1 & 5\%189 & -1/27 & -1/21\end{array}\right]$$

$$\begin{bmatrix}-19/378 & 1/27 & 5/42\\ -8/189 & 2/27 & -1/27\\ 5\%189 & -1/27 & -1/21\end{bmatrix}$$