Mohammad Ali Jinnah University

Chartered by Government of Sindh - Recognized by HEC

Quiz 2

Name: Muhamad Fahad

Id: FA19-BSSE-0014

Subject: Linear Algebra (Fall 2020)

Section: AM

Teacher: Dr. Asmat Ara

Date: Wednesday, November 4, 2020

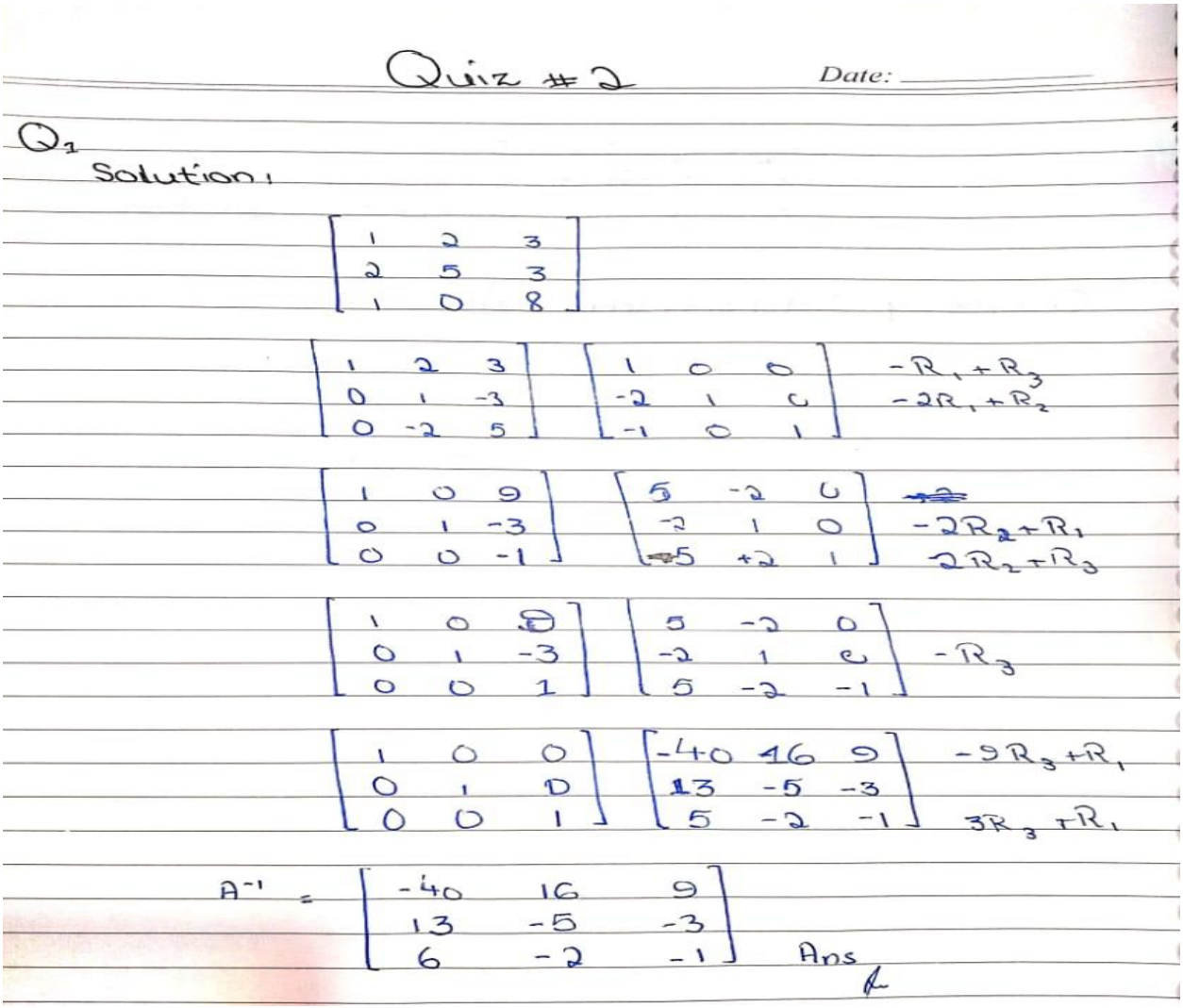
Linear Algebra

Quiz#2

Instructor Name: Dr. Asmat Ara **Total Marks: 10**
Date: 4-11-2020 **Time:**

Q.1 Find the inverse of the following matrix.

$$Z=\begin{bmatrix}1 & 2 & 3\\ 2 & 5 & 3\\ 1 & 0 & 8\end{bmatrix}$$



Q.2 Evaluate rank and nullity of the following matrix

$$\boldsymbol{A} = \begin{bmatrix} 1 & -3 & 4 & -2 & 5 & 4 \\ 2 & -6 & 9 & -1 & 8 & 2 \\ 2 & -6 & 9 & -1 & 9 & 7 \\ -1 & 3 & -4 & 2 & -5 & -4 \end{bmatrix}$$

Date:

Q_2

Sol:-

$$\begin{bmatrix} 1 & -3 & 4 & -2 & 5 & 4 \\ 2 & -6 & 9 & -1 & 8 & 2 \\ 2 & -6 & 9 & -1 & 9 & 7 \\ 1 & 3 & 4 & 2 & -5 & -4 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -3 & 4 & -2 & 5 & 4 \\ 0 & 0 & 1 & 3 & -2 & -6 \\ 0 & 0 & 1 & 3 & -1 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{matrix} -2R_1+R_2 \\ -2R_1+R_3 \\ -R_1+R_4 \end{matrix}$$

$$\begin{bmatrix} 1 & -3 & 0 & -14 & 13 & 28 \\ 0 & 0 & 1 & 3 & -2 & -6 \\ 0 & 0 & 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{matrix} \\ -R_2+R_3 \\ -4R_2+R_4 \\ \end{matrix}$$

$$\begin{bmatrix} 1 & -3 & 0 & -14 & 0 & -37 \\ 0 & 0 & 1 & 3 & 0 & 4 \\ 0 & 0 & 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{matrix} -13R_3+R_1 \\ 2R_3+R_2 \\ \\ \end{matrix}$$

$$\begin{bmatrix} 1 & -3 & 0 & -14 & 0 & -37 \\ 0 & 0 & 1 & 3 & 0 & 4 \\ 0 & 0 & 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

rank : 3

Nullity

$$x_1 - 3x_2 - 14x_4 - 37x_6 \quad -(i)$$
$$x_3 + 3x_4 + 4x_6 \quad -(ii)$$
$$x_5 + 5x_6 \quad -(iii)$$

∵ Let $x_2 = t$, $x_4 = s$ & $x_6 = u$

Now eq (i):

$x_1 = 3x_2 + 14x_4 + 37x_6$ ∵ put all the value

$x_1 = 3t + 14s + 37u \quad -(i)$

$x_2 = t$

$x_3 = -3s - 4u$

$x_4 = s$

$x_5 = -5u$

$x_6 = u$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_6 \\ x_6 \end{bmatrix} = t \begin{bmatrix} 3 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} 14 \\ 0 \\ -3 \\ 1 \\ 0 \\ 0 \end{bmatrix} + u \begin{bmatrix} 37 \\ 0 \\ -4 \\ 0 \\ -5 \\ 1 \end{bmatrix}$$

Nullity = 3 ; Total no of column = Nullity + Rank

$= 3 + 3 = 6$