Mohammad Ali Jinnah University

Chartered by Government of Sindh - Recognized by HEC

Quiz 4

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Id: FA19-BSSE-0014

Subject: Linear Algebra (Fall 2020)

Section: AM

Teacher: Dr. Asmat Ara

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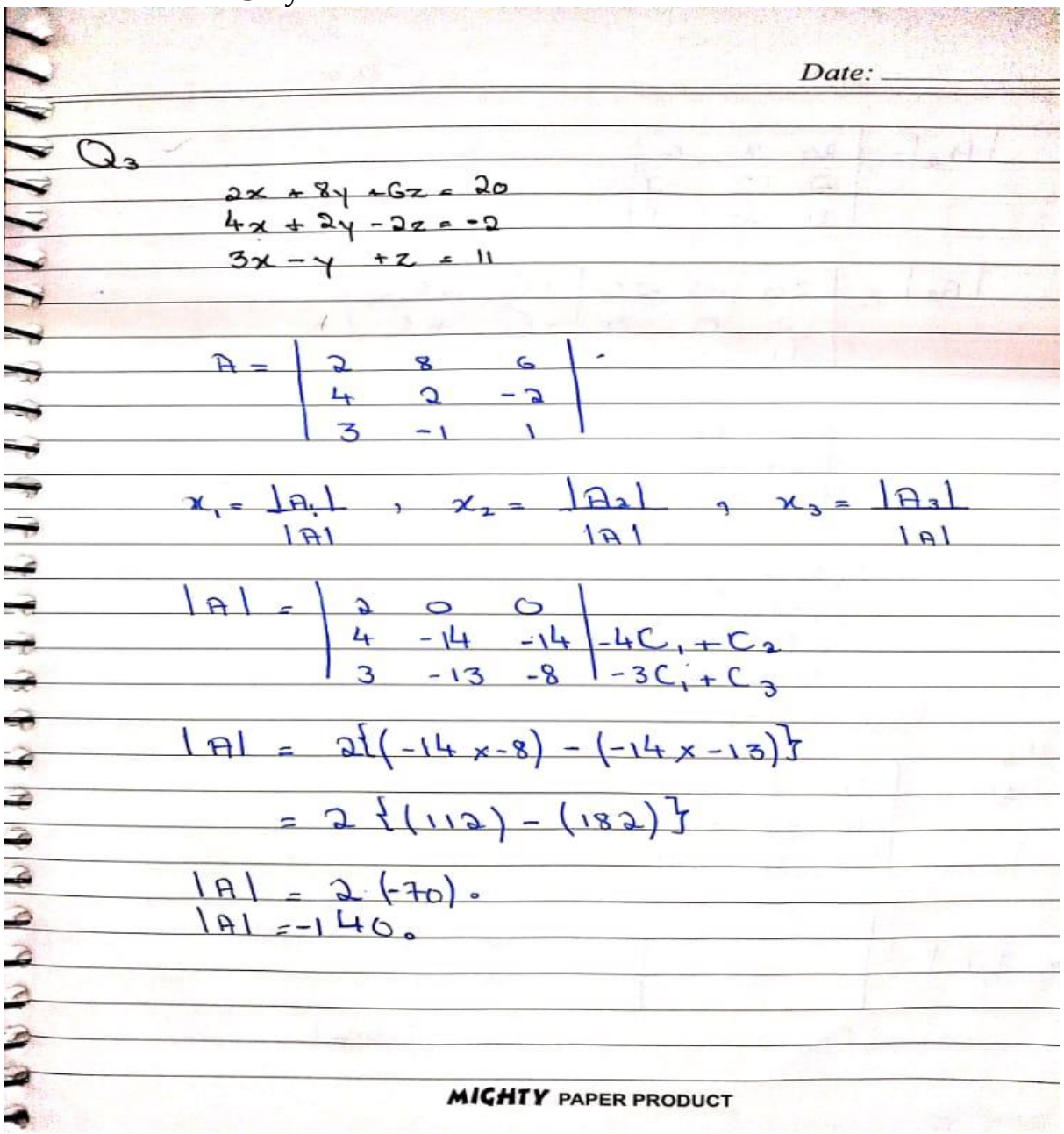
Q.1 Use Cramer's rule to solve the system of equations.

$2x+8y+6z=20$

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

$3x-y+z=11$



Date:

Q3

$2x + 8y + 6z = 20$

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

$3x - y + z = 11$

$$A = \begin{vmatrix} 2 & 8 & 6 \\ 4 & 2 & -2 \\ 3 & -1 & 1 \end{vmatrix}$$

$$x_1 = \frac{|A_1|}{|A|}, \quad x_2 = \frac{|A_2|}{|A|}, \quad x_3 = \frac{|A_3|}{|A|}$$

$$|A| = \begin{vmatrix} 2 & 0 & 0 \\ 4 & -14 & -14 \\ 3 & -13 & -8 \end{vmatrix} \begin{matrix} \\ -4C_1 + C_2 \\ -3C_1 + C_3 \end{matrix}$$

$$|A| = 2\{(-14 \times -8) - (-14 \times -13)\}$$

$$= 2\{(112) - (182)\}$$

$$|A| = 2(-70).$$

$$|A| = -140.$$

MIGHTY PAPER PRODUCT

$$|A_1| = \begin{vmatrix} 20 & 8 & 6 \\ -2 & 2 & -2 \\ 11 & -1 & 1 \end{vmatrix}$$

$$\begin{vmatrix} 20 & 28 & -14 \\ -2 & 0 & 0 \\ 11 & 10 & -10 \end{vmatrix} \quad \begin{matrix} C_1 + C_2 \\ -C_3' + C_3 \end{matrix}$$

$$|A_1| = (-) \begin{vmatrix} -2 & 0 & 0 \\ 20 & 28 & -14 \\ 11 & 10 & -10 \end{vmatrix}$$

$$|A_1| = (-)(-2)(-280 - (-140))$$

$$2(-140)$$

$$|A_1| = -280$$

$$|A_2| = \begin{vmatrix} 2 & 20 & 6 \\ 4 & -2 & -2 \\ 3 & 11 & 1 \end{vmatrix}$$

$$|A_2| = (2)\begin{vmatrix} 1 & 10 & 3 \\ 4 & -2 & -2 \\ 3 & 11 & 1 \end{vmatrix} \quad \frac{1}{2}R_1 \Rightarrow \quad (2)\begin{vmatrix} 1 & 0 & 0 \\ 4 & -42 & -14 \\ 3 & -19 & -8 \end{vmatrix} \quad \begin{matrix} -10C_1 + C_2 \\ -3C_1 + C_3 \end{matrix}$$

$$|A_2| = (2)\{1(-42 \times -8) - (-14 \times -19)\}$$

$$=$$

$|A_1| = 140$

Ans

$|A_3| = ?$

$$|A_3| = \begin{vmatrix} 2 & 8 & 20 \\ 4 & 2 & -2 \\ 3 & -1 & 11 \end{vmatrix}$$

$$= \begin{vmatrix} 2 & 0 & 0 \\ 4 & -14 & -42 \\ 3 & -13 & -19 \end{vmatrix} \quad \begin{matrix} -4C_1 + C_2 \\ -10C_1 + C_2 \end{matrix}$$

$$= 2\{-42 \times -13 - (-19 \times -14)\}$$

$$= 2 \times -280$$

$$|A_3| = -560$$

$$x_1 = \frac{|A_1|}{|A|}, \quad x_2 = \frac{|A_2|}{|A|}, \quad x_3 = \frac{|A_3|}{|A|}$$

$$= \frac{-280}{-140}, \quad = \frac{140}{-140}, \quad \frac{-560}{-140}$$

$$x_1 = 2, \quad x_2 = -1, \quad x_3 = +4$$

Q.2 Determinate whether the vectors .

$$v_1 = (1,2,2,-1), v_2 = (4,9,9,-4), v_3 = (5,8,9,-5)$$

In R^4 are c

Q_2

Solution:-

$K_1 V_1 + K V_2 + K V_3$

$K(1,2,2,-1) + K_2(4,9,9,-4) + K_3(5,8,9,-5)$

$K_1 + 4K_2 + 5K_3 = 0 \quad -(i)$

$2K_1 + 9K_2 + 8K_3 = 0 \quad -(ii)$

$2K_1 + 9K_2 + 9K_3 = 0 \quad -(iii)$

$-K + 4K_2 - 5K_3 = 0 \quad -(iv)$

$$\begin{vmatrix} 1 & 4 & 5 \\ 2 & 9 & 8 \\ 2 & 9 & 9 \\ -1 & -4 & -5 \end{vmatrix} = 0$$

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

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{matrix} +2R_3 + R_2 \\ -5R_3 + R_1 \end{matrix}$$

$K_1 = 0$

$K_2 = 0$ } Therefore linearly independent

$K_3 = 0$