2021

National University of Computer and Emerging Sciences, Lahore Campus

Course:	Linear Algebra		Course Code:	
Program:	BSE (3A)		Semester:	3A
Duration:			Total Marks:	03
Paper Date:	Time: 20 minutes 30/09		Weight	03
Section:	BSSE 3A1		Page(s):	
Exam:			Roll No:	[redacted]
Instruction/Notes:	Attempt All Questions			

Q① Use parametric equations to describe the infinite solutions of: $x_1+3x_2-x_3=-4$, $3x_1+9x_2-3x_3=-12$, $-2x_1-6x_2+2x_3=8$

Let $x_1 = y$, $x_2 = x_2$

Eq.1 $\rightarrow$ $y+3x_2-x_3=-4$ 0.5

Eq.2 $\rightarrow$ $3y+9x_2-3x_3=-12$

Eq.3 $\rightarrow$ $-2y-6x_2+2x_3=8$

using Eq.1

$x_1 = y$

$x_2 = \dfrac{-4+x_3-3x_2-y}{3}$

$x_3 = \dfrac{8+6x_2+2y}{2}$ 2.5 / 3.0

Q② Find the value of k, for which the augmented matrix of a consistent system is: $\begin{bmatrix} 1 & k & -1 \\ 4 & 8 & -4 \end{bmatrix}$ 1.0

$R_2 - 4R_1$

$\begin{bmatrix} 1 & k & -1 \\ 0 & (8-4k) & 0 \end{bmatrix}$

$[x + ky = -1] \times -4$

$4x + 8y = -4$

$-4x - 4ky = 4$

$+\ 4x + 8y = -4$

$(8-4k)y = 0$

so that $0=0$ and infinite solutions exist. (P.T.O)

$8-4k=0$

$4k=8$ $\boxed{k=2}$

~~unique solution~~

IF $k \neq 2$ then $y=0$, $x=-1$

so for all values of k, consistent

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Q③ Solve by Gauss Jordan Method

$-2b+3c=1$, $3a+6b-3c=-2$, $6a+6b+3c=5$

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

$\downarrow R_{12}$

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

$\downarrow R_1 \times 1/3$

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

$\downarrow R_3 - 6R_1$

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

$\downarrow R_2 \times -1/2,\ R_3 + 6R_2$

$$\begin{bmatrix} 1 & 2 & -1 & -2/3 \\ 0 & 1 & -3/2 & -1/2 \\ 0 & 0 & 0 & 6 \end{bmatrix}$$

$\downarrow R_1 - 2R_2$

$$\begin{bmatrix} 1 & 0 & 2 & 1/3 \\ 0 & 1 & -3/2 & -1/2 \\ 0 & 0 & 0 & 6 \end{bmatrix}$$

$\downarrow R_3 \times 1/6$

$$\begin{bmatrix} 1 & 0 & 2 & 1/3 \\ 0 & 1 & -3/2 & -1/2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$\downarrow R_2 + 1/2 R_3$

$$\begin{bmatrix} 1 & 0 & 2 & 1/3 \\ 0 & 1 & -3/2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$\downarrow R_1 - \frac{1}{3} R_3$

$$\begin{bmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & -3/2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

↑ Answer

$a + 2c = 0$

$b - 3/2\, c = 0$

$0 = 1$ (False) no solutions exist