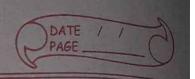
Himanshu Dixit B64178 Batch-B10



Bridge Course (21B19GEIII)

Assignment Unit 2

o.
$$X = A^{-1}B$$

$$|A| = 1(1-2) - 1(-1-4) + (1+2) = -1+5+3 = 7 \neq 0$$
i.e A^{-1} exist.

$$\mathbf{M} = \begin{bmatrix} -1 & -5 & 3 \\ -2 & -3 & -1 \\ 3 & 1 & -2 \end{bmatrix} \rightarrow \mathbf{C} = \begin{bmatrix} -1 & 5 & 3 \\ 2 & -3 & 1 \\ 3 & -1 & -2 \end{bmatrix}$$

$$adj A = \begin{bmatrix} -1 & 2 & 3 \\ 5 & -3 & -1 \\ 3 & 1 & -2 \end{bmatrix} \quad \begin{array}{c} 0 & A^{-1} = 1 \\ 1A1 & \\ A^{-1} = 1 \\ 7 & 5 & -3 & -1 \\ 3 & 1 & -2 \end{bmatrix}$$

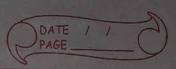
$$X = \frac{1}{7} \begin{bmatrix} 1 & 2 & 3 \\ 6 & 3 & 1 \\ 3 & 1 & -2 \end{bmatrix} \begin{bmatrix} 6 \\ 2 \\ 3 \end{bmatrix}$$

$$= \frac{1}{7} \begin{bmatrix} \frac{7}{21} \\ \frac{21}{14} \end{bmatrix} = \begin{bmatrix} \frac{1}{3} \\ \frac{2}{2} \end{bmatrix} = \begin{bmatrix} \frac{\chi^2}{2} \\ \frac{\chi^2}{2} \end{bmatrix}$$

on comparing:
$$x = \pm 1$$
, $y = \pm \sqrt{3}$, $z = \pm \sqrt{2}$

$$\frac{1}{x} + \frac{2}{y} + \frac{4}{z} = 1$$

$$\frac{2}{x} + \frac{3}{y} + \frac{8}{z} = 0 \longrightarrow \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 8 \\ 1 & 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 1/x \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 8 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 4 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 4 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 4 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 4 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1/x \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 1/x \\ 2 &$$



Le A exist.
$$m = \begin{bmatrix} -42 & 28 & 21 \\ -16 & 14 & 11 \\ 4 & 0 & -1 \end{bmatrix} \rightarrow C = \begin{bmatrix} -42 & -28 & -21 \\ 16 & 14 & -11 \\ 4 & 0 & -1 \end{bmatrix}$$

$$\circ$$
 Adj $A = C^{T} = \begin{bmatrix} -42 & 16 & 4 \\ -28 & 14 & 0 \\ -21 & -1 & -1 \end{bmatrix}$

$$A^{+} = \frac{1}{1A1} \text{ ady } A$$

$$A^{+} = \frac{1}{-14} \begin{bmatrix} -42 & 16 & 4 \\ -28 & 14 & 0 \\ \end{bmatrix}$$

$$X = \begin{bmatrix} -42 & 16 & 4 \\ -28 & 14 & 0 \\ -24 & -11 & -1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 5' \end{bmatrix}$$

$$= \frac{1}{17} \begin{bmatrix} -24 & -11 & -1 & 15 \\ -22 & -25 \\ -26 & -17 \end{bmatrix}$$

$$\therefore \text{ on companing}$$

$$x = \frac{7}{11}, y = \frac{1}{2}, z = \frac{7}{13}$$
A

$$\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & -b_2 & c_2 \\ a_3 & b_3 & -c_3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$a_1x + b_1y + c_1z = 3$$

 $a_2x - b_2y + c_2z = 7$
 $a_3x + b_3y - c_3z = 11$

$$a_1x + b_1y + c_1z = 3$$
 $a_1 b_1 c_1$
 $a_2x - b_2y + c_2z = 7$
 $a_2 - b_2 c_2$
 $a_3x + b_3y - c_3z = 11$
 $a_3 + b_3y - c_3z = 11$
 $a_3 + b_3y - c_3z = 11$

$$|A| \neq 0$$
 : It has unique solution $\rightarrow \times = A^{\dagger}C$
 $(A^{\dagger} \text{ exist})$

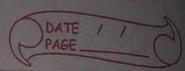
$$Q \cdot 4 \cdot A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 1 & 1 & 5 \end{bmatrix}$$

(i)
$$(adjA)^{-1} = adj(A^{-1}) \longrightarrow LoHos: 74A = \begin{bmatrix} 14 & 9 & -1 \\ 9 & 4 & -1 \\ -1 & -1 & -1 \end{bmatrix} \longrightarrow Gf = \begin{bmatrix} 14 & -9 & -1 \\ -9 & 4 & 1 \\ -1 & 1 & -1 \end{bmatrix}$$

$$adj^{a}A = \left(Cofa \right)^{T} = \begin{bmatrix} 14 & -9 & +1 \\ -9 & 4 & 1 \end{bmatrix}$$
 Let $adj^{a}A = C$

$$|C| = |4(-5)+9(9+1)-1(-5) = -70+90+5 = 25 \neq 0$$
 C^{-1} Exist

$$Mc = \begin{bmatrix} -5 & 10 & -5 \\ 10 & -18 & 5 \end{bmatrix} \longrightarrow Cc = \begin{bmatrix} -5 & -10 & -5 \\ -10 & 45 & -5 \end{bmatrix} \therefore C^{-1} = \underbrace{1}_{1e1} \text{ adjec}$$



$$C^{-1} = 1 \begin{bmatrix} -5 & -10 & -5 \\ -10 & -15 & -5 \end{bmatrix} \rightarrow (Adj A5^{1} = -1) \begin{bmatrix} 1 & 2 & 1 \\ 5 & +2 & 3 & 1 \\ 1 & 1 & +5 \end{bmatrix}$$

R.H.S:
$$adj(A^{-1}) = adj(1 adjA') = adi[1 [14-9-1]]$$

$$adj[A^{-1}] = adj(1 adjA') = adi[1 [14-8-1]]$$

$$adj[A^{-1}] = adj[1 adjA'] = adi[1 adjA'] = adi[1 adjA']$$

$$adj[A^{-1}] = adj[1 adjA'] = adi[1 adjA'] = adi[1 adjA']$$

$$adj[A^{-1}] = adj[1 adjA'] = adi[1 adjA'$$

hence , 1.4.5 = R.H.S

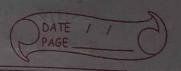
$$adjA = \begin{bmatrix} 14 - 9 - 1 \\ -9 & 4 & 1 \\ -1 & 1 & -1 \end{bmatrix}$$

$$|A| = -5 \neq 0$$
 i.e A-1 exist
 $adjA = \begin{bmatrix} 14 - 9 - 1 \\ -9 & 4 & 1 \\ -1 & 1 & -1 \end{bmatrix}$ Rence, $A^{+} = \mathbf{x} = -1$ $\begin{bmatrix} 14 - 9 & -1 \\ 5 & -9 & 4 & 1 \\ -1 & 1 & -1 \end{bmatrix}$

from above:
$$adj x = adj (A^{-1}) = -1 \begin{bmatrix} 1 & 2 & 1 \\ 5 & 1 & 1 + 5 \end{bmatrix}$$

$$|X| = -\frac{14}{5} \left(\frac{+4}{25} + \frac{1}{5} \right) + \frac{9}{5} \left(-\frac{9}{25} - \frac{1}{25} \right) + \frac{1}{3} \left(\frac{9}{25} - \frac{4}{25} \right)$$

$$(A^{-1})^{\frac{1}{2}} \supset C^{\frac{1}{2}} = \frac{1}{|x|} \text{ and } |x| = \frac{5 \times 1}{5} \begin{bmatrix} \frac{12}{23} \\ \frac{23}{11} \end{bmatrix} = \begin{bmatrix} \frac{1}{23} \\ \frac{23}{11} \end{bmatrix} = A$$



0.6.	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
	1 x x+y 0 0 x (Expand along 1st coloumn)
	$R_2 \rightarrow R_2 - R_1$
	13g-3 Rg-R1
	12 x2 2441
Q.7·	(i) $\begin{vmatrix} \alpha & \alpha^2 & \beta+8 \end{vmatrix} = (\beta-8)(8-\alpha)(\alpha-\beta)(\alpha+\beta+8)$ $\begin{vmatrix} \beta & \beta^2 & 8+\alpha \end{vmatrix}$
	8 82 X+B
	[.H.S x x2 B+8; (B-x)(8-x) x x2 B+8;
	$R \rightarrow R - R $ $\beta - \alpha (\beta - \alpha)(\beta + \alpha) - (\beta - \alpha) = 1 $ $\beta + \alpha - 1$
	Ry - Ry - R1 8-0 (8-0)(8+0) -(8-0)
	$=$ $1 \times 10^{12} \times 10^{2} \times 1$
V.	$= \alpha+\beta+8 \alpha^2 \beta+8 = (\alpha+\beta+8)(\beta-\alpha)(8-\alpha)(8-\alpha)(8-\alpha)(8-\alpha)$
C1+4+C3	$ \begin{array}{c cccc} (\beta-\alpha) & O & \beta+\alpha & - & (expand along C_1) \\ \hline & & & & & & \\ \hline & & & & & \\ \hline & & & &$
	= (x+p+8)(x-b)(b-8)(8-x) R·HJ
	Lotts = Rottes ; hence Proved
(ii)	$ x x^2 + x^3 - (1 + x + x)(x - x)(x - x)$
(1)	
	$\begin{vmatrix} z & z^2 & 1 + \rho z^3 \end{vmatrix}$
	Littis: By using Property x x2 1 + x x2 px3 y y2 1 + y y2 py3
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Z Z ² Z Z ² P2 ³
	x x2 1 (pnyz) 1 x x2 (1+pxyz) x x2 1
	2 2
	(1+ px 4z) x x² 1) (1. my x 1(y-x)(z-x) x x² 1)
Rose	1 - (+)3/2/3/2/3/2/
"L 1 K2 + K	2
R3 - R3-	4
	= $(1+p\times yz)(y-x)(z-x)[z+x-y-k]$ (expand along 3 doloumn)
	= (1+pxyz)(x-y)(y-z)(z-x) Ay R.H.S

Littis = Rittis; hence Proved

(iii)	13a -a+b -a+c	
	-b+a 3b -b+c = 3(a+b+c) (ab+be+ca)	
	-c+a -c+b 3c	
L·H·S	: C1 - C1+C2+C3 a+b+c - a+b - a+c = (a+b+c) 1 - a+b - a+c	1
	a+b+c 3b -b+c 1 3b -b+c	
	1 a+6+c -c+b 3c 1 -c+b 3c	
	R-1 R2-R 11a+b -a+c (a+b+c) (a+b+c) (2b+a)(2c+a)-c	1-67(0-1)
	$R_3 \rightarrow R_3 - R_1$ 0 2b+a a-b =	
	13 18 11 0 a-c 2c+a (expand along C1)	
	= (a+b+c) [4bc+2ab+2ac+gh-f+ac+ab-bc]	
	= 3(a+b+c)(ab+bc+ac) R·H·s	
	LH3 = R.H.3; Rence Broved	