Ex-1 Find inverse let $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & -1 & 1 \\ 3 & -2 & -1 \end{bmatrix}$

$A^{-1} = \frac{adj\,A}{|A|}$ (formula).

Now $|A| = \begin{vmatrix} 1 & 3 & 2 \\ 2 & -1 & 1 \\ 3 & -2 & -1 \end{vmatrix}$

$= 1(1+2) - 3(-2-3) + 2(-4+3)$

$= 3 + 15 - 2 = 16$

Now Co-factor of $a_{11} = (1+2) = 3$

" " $a_{12} = -(-2-3) = 5$

" " $a_{13} = (-4+3) = -1$

" " $a_{21} = -(-3+4) = -1$

" " $a_{22} = (-1-6) = -7$

" " $a_{23} = -(-2-9) = 11$

" " $a_{31} = (3+2) = 5$

" " $a_{32} = -(1-4) = 3$

" " $a_{33} = (-1-6) = -7$

$\therefore$ Co-factors of $A = B$ (say) $= \begin{bmatrix} 3 & 5 & -1 \\ -1 & -7 & 11 \\ 5 & 3 & -7 \end{bmatrix}$

$\therefore adj\,A = B^T = \begin{bmatrix} 3 & -1 & 5 \\ 5 & -7 & 3 \\ -1 & 7 & -7 \end{bmatrix}$

$\therefore A^{-1} = \frac{adj\,A}{|A|} = \frac{1}{16}\begin{bmatrix} 3 & -1 & 5 \\ 5 & -7 & 3 \\ -1 & 11 & -7 \end{bmatrix}$

$= \begin{bmatrix} 3/16 & -1/16 & 5/16 \\ 5/16 & -7/16 & 3/16 \\ -1/16 & 11/16 & -7/16 \end{bmatrix}$ Ans

Ex2 If $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & 0 & 3 \\ 3 & -1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ 0 & 2 \\ -1 & 4 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 2 & 3 & -4 \\ 2 & 0 & -2 & 1 \end{bmatrix}$

then show that

$$A(BC) = (AB)C$$

The problem is avoidable as it is wrong.

Ex3 Find inverse. Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$

$A^{-1} = \dfrac{\text{adj}A}{|A|}$ (A/ formula)

Now $|A| = 1(18-12) - 1(9-3) + 1(4-2) = 6-6+2 = 2 \neq 0$

Co-factors of $a_{11} = (18-12) = 6$.

$a_{12} = -(9-3) = -6$

$a_{13} = (4-2) = 2$

$a_{21} = -(9-4) = -5$

$a_{22} = (9-1) = 8$

$a_{23} = -(4-1) = -3$

$a_{31} = (3-2) = 1$

$a_{32} = -(3-1) = -2$

$a_{33} = (2-1) = 1$

Co-factors of $A = B$ (say) $= \begin{bmatrix} 6 & -6 & 2 \\ -5 & 8 & -3 \\ 1 & -2 & 1 \end{bmatrix}$

$\text{adj}A = B^T = \begin{bmatrix} 6 & -5 & 1 \\ -6 & 8 & -2 \\ 2 & -3 & 1 \end{bmatrix}$

$\therefore A^{-1} = \dfrac{\text{adj}A}{|A|}$

$= \dfrac{1}{2}\begin{bmatrix} 6 & -5 & 1 \\ -6 & 8 & -2 \\ 2 & -3 & 1 \end{bmatrix} = \begin{bmatrix} 3 & -5/2 & 1/2 \\ -3 & 4 & -1 \\ 1 & -\frac{3}{2} & \frac{1}{2} \end{bmatrix}$ Ans.

Dr. G.S. Mahato
Asso. prof. Dept of Maths,
MLS RKS College Saharsa.

Th-1

(ii)

$A \times (B - C) = A \times B - A \times C$.

Let (x, y) be arbitrary

$\therefore (x,y) \in A \times (B - C) \Leftrightarrow x \in A,\ y \in (B - C)$

$\Leftrightarrow x \in A,\ (y \in B \ \&\ y \notin C)$

$\Leftrightarrow (x \in A,\ y \in B) \ \&\ (x \in A,\ y \notin C)$

$\Leftrightarrow (x,y) \in A \times B \ \&\ (x,y) \notin A \times C$

$\Leftrightarrow (x,y) \in A \times B - A \times C$

$\therefore A \times (B - C) = A \times B - A \times C$

Relation

Let $A = \{x, y, z\}$

$A \times A = \{x, y, z\} \times \{x, y, z\}$

$= \{(x,x), (x,y), (x,z), (y,x), (y,y), (y,z), (z,x), (z,y), (z,z)\}$

$R = \{(x,y), (y,z), (x,x), (z,z)\}$.

$R \subseteq A \times A$

Then R is said to be Relation

In other words.

Let A be nonempty set & R represents a relation then Relⁿ is subset of Cartesian product.

Types of Relation

Empty Relation or Null relation

$\phi \subseteq A \times A$

Identity Relation

$I_A = \{(x,y) \in R \Rightarrow x = y\}$

Universal Relation

$A \times A \subseteq A \times A$

Dr. B.K. Singh.
Asso. Prof. Dept. of Maths
SNS RKS College Saharsa.