Lecture 0

Math Fundamentals

Tablet : WACOM DTU 1141 B
Model No.

$S_8 = \{0, 1, 2, \ldots, (7)\}$ modulo 8

$4 \times 2 =? 0$ ✓ $11 \times 13 = 143 = (8)$

neither 4 nor $2 \neq 0$

$Ax = b$

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & & & \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix} \quad \begin{matrix} b \\ b_1 \\ b_2 \\ \vdots \\ b_m \end{matrix}$$

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} & b_1 \\ 0 & \cdots & & a'_{2n} & b'_2 \\ 0 & \cdots & & 0 & 0 \\ 0 & \cdots & & 0 & 0 \end{bmatrix} \quad (m-r) \rightarrow$$

$$\tilde{A} = \left[\begin{array}{cc|c} 2 & 3 & 8 \\ 4 & 7 & 21 \end{array}\right]$$

$$\begin{aligned} 2x + 3y &= 8 \\ 4x + 7y &= 21 \end{aligned}$$

$R_2 \to R_2 - 2 \cdot R_1$

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

$R_1 \to R_1 - 3R_2$

$$\begin{bmatrix} 2 & 0 & -7 \\ 0 & 1 & 5 \end{bmatrix}$$

$R_1 \to R_1 / 2$

$$\begin{bmatrix} 1 & 0 & -3.5 \\ 0 & 1 & 5 \end{bmatrix}$$

$x = -3.5$, $y = 5$

$A_{n \times n}$:

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & & & \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}$$

C_{ij} $\quad 1 \le i \le n$, $1 \le j \le n$

$$\det(A) = a_{21} \cdot C_{21} + a_{22} \cdot C_{22} \cdots + a_{2n} \cdot C_{2n}$$

$$\det(A) : a_{1n} \cdot C_{1n} + a_{2n} \cdot C_{2n} + \cdots + a_{nn} \cdot C_{nn}$$

$$A = \begin{bmatrix} 1 & 3 \\ 4 & 8 \end{bmatrix} \quad ; \quad M = \begin{bmatrix} 8 & 4 \\ 3 & 1 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 3 \\ 4 & 8 \end{bmatrix} ; M = \begin{bmatrix} 8 & 4 \\ 3 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} 8 & -4 \\ -3 & 1 \end{bmatrix}$$

$\text{Det}(A) = 1.8 + 3 \times -4 = 8 - 12 = -4$

$= 4 \times -3 + 8 \times 1 = -12 + 8 = -4$

$= 3 \times -4 + 8 \times 1 = -4$

$= 1 \times 8 + 4 \times -3 = -4$