1, 2, 3, 4, 5

$\mathbb{N}$

$ax+by=c$

$a, b, c \in \mathbb{N}$

$\ldots, -2, -1, 0, 1, 2, 3, 4$

$\mathbb{Z}$

$\mathbb{Q} = \left\{ \frac{p}{q} ;\ p, q \in \mathbb{Z},\ q \neq 0 \right\}$

$\mathbb{R} = \mathbb{Q} \cup \mathbb{Q}^c$

$x^2+1=0$

$\mathbb{C} = \{ a+ib : a, b \in \mathbb{R} \}$

$\mathbb{N} \subseteq \mathbb{Z} \subseteq \mathbb{Q} \subseteq \mathbb{R} \subseteq \mathbb{C}$

$a \in \mathbb{N}$ $\quad b \in \mathbb{N}$

$b = \frac{1}{a}$ $\quad a + b = 0$ $\quad ax + by = c$

$a \in \mathbb{Z}$ $\quad b \in \mathbb{Z}$ $\quad b = -a$

s.t. $a \cdot b = 1$

$m \times n$

$$\begin{array}{cc} \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & & & \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix} & \begin{array}{c} 1 \\ 2 \\ 3 \\ m \end{array} \end{array}$$

a_{ij}

$$A = \left(\quad \right)_{m \times n}$$

$$AB = D$$

$$A+B = C$$

$d_{ij} = a_{ij} \cdot b_{ij}$

$$A = (a_{ij})_{m \times n}$$

$$B = (b_{ij})_{m \times n}$$

$$A = a$$

$$c_{ij} = a_{ij} + b_{ij}$$

$A = (a_{ij})_{m \times n}$

$\alpha \in \mathbb{R}$,

$\alpha A = (\alpha a_{ij})$

$$A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ \vdots & & & \\ \vdots & & & \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix}$$

$$\alpha A = \begin{pmatrix} \alpha a_{11} & \alpha a_{12} & \cdots & \alpha a_{1n} \\ \vdots & & & \\ \alpha a_{m1} & \cdots & \cdots & \alpha a_{mn} \end{pmatrix}$$

$A_{m\times n}$ $B_{m\times n}$

$A = (a_{ij})_{m\times n}$ $B = (b_{ij})_{m\times n}$

$C = (c_{ij})$

$c_{ij} = a_{ij} b_{ij}$

$$AB = \begin{pmatrix} a_{11}B, & a_{12}B, & \cdots & a_{1n}B \\ a_{m1}B, & a_{m2}B & \cdots & a_{mn}B \end{pmatrix}$$

$A_{m \times n}$ $B_{n \times k}$

$$C = A \cdot B = (c_{ij})$$

$$c_{ij} = \sum_{k=1}^{n} a_{ik} b_{kj}$$

A, B, C

$(A+B)+C = A+(B+C)$

$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}_{2\times 3}$

$B = \begin{pmatrix} a \\ b \\ c \end{pmatrix}_{3\times 1}$

$\underset{A}{\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}} \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \xrightarrow{B}$

$\begin{pmatrix} a+2b+3c \\ 4a+5b+6c \end{pmatrix}$

$A+B = 0$?

$A \cdot B = 0$

A, B, C

$$A\cdot(B+C) = A\cdot B + A\cdot C$$

$$\begin{pmatrix} \cancel{} & * & * & * \\ 0 & \ddots & & * \\ 0 & 0 & & \end{pmatrix}$$

$A = (a_{ij})_{n\times n}$

square matrix

$A = (a_{ij})_{n\times n}$

upper triangular

$A = (a_{ij})_{m \times n}$

$B = A^T = (b_{ij})_{n \times m}$

$b_{ij} = a_{ji}$

$B^T = A$

$A = (a_{ij})_{m \times m}$

called symmetric

if $A = A^T$

Skew-symmetric

if $A = -A^T$.