

# Chapter ①-② Sequence of Numbers and Set of sum and product

## Sequence

example) 1, 2, 3, 4

$$\underbrace{x_1, x_2, x_3, x_4, x_5, x_6}_{\text{"Index"}}$$

$$x_1, x_2, \dots, x_N$$

$$x_{1:N}$$

Set If sequentiality is not important, then use "Set"

example)  $\{1, 2, 3, 4\}$

$$\{x_1, x_2, x_3, x_4, x_5, x_6\}$$

$$\{x_1, x_2, \dots, x_N\}$$

$$\{x_i\}_N$$

- real number set ( $\mathbb{R}$ )

$$x \in \mathbb{R}$$

$$(x_1, x_2) \in \mathbb{R} \times \mathbb{R}$$

$$(x_1, x_2) \in \mathbb{R}^2$$

## Sequence of sum and product

$$- \sum_{i=1}^N x_i = x_1 + x_2 + \dots + x_N$$

$$- \prod_{i=1}^N x_i = x_1 \cdot x_2 \cdot \dots \cdot x_N$$

$$\text{example) } \sum_{i=1}^4 i = 1 + 2 + 3 + 4 = 10$$

$$\begin{aligned} \sum_{k=1}^9 10k &= 10 \cdot 1 + 10 \cdot 2 + \dots + 10 \cdot 9 \\ &= 10 + 20 + \dots + 90 \end{aligned}$$

$$\prod_{i=10}^{20} i = (10) \cdot (11) \cdot \dots \cdot (20)$$

$$- \sum_{i=1}^N \left( \sum_{j=1}^M x_{ij} \right) = \sum_{i=1}^N \sum_{j=1}^M x_{ij}$$

$$\begin{aligned} \text{example) } \sum_{i=1}^2 \sum_{j=1}^3 (i+j) &= \sum_{i=1}^2 \left( \sum_{j=1}^3 (i+j) \right) = \sum_{i=1}^2 \left( (i+1) + (i+2) + (i+3) \right) \\ &= ((1+1) + (1+2) + (1+3)) + ((2+1) + (2+2) + (2+3)) \\ &= 9 + 12 = 21 \end{aligned}$$