

## Definition of a Set.

- a collection of objects  
↳ can be abstract
- often written in roster notation  
 $\{a, b, c, \dots, z\}$
- membership is written  $\{x \in \mathbb{R}\}$
- absence is written  $\{x \notin \mathbb{R}\}$

### DEFINITION OF SET EQUALITY:

Set equality is deemed when both sets share each of their respective elements  $\Rightarrow A=B$ .  
Any asymmetry is unequal  $\Rightarrow A \neq B$ .

Ex. ①  $\{1, 2\} = \{2, 1\}$  \* order is irrelevant

②  $\{1, 1, 2\} = \{1, 2\}$  \* frequency doesn't matter.

### DEFINITION OF SUBSETS:

When a set's elements are all found in another set.  
Can be written  $A \subseteq B$ .

The " $\subseteq$ " relation is referred to as set inclusion.

$A \subseteq B$  AND  $B \subseteq A$  } Given by definitions of  
 $\Leftrightarrow A=B$ .      ① Equality ② Inclusion.

Known as a "proper subset":  $\left\{ \begin{array}{l} A \subseteq B \text{ AND } A \neq B \\ \Leftrightarrow A \subset B \end{array} \right.$

Universal Set:  $\{x \mid x \in S \text{ and } x \text{ satisfies } P\}$

↳ can shorten to  $\{x \mid x \text{ satisfies } P\}$

Empty Set ( $\emptyset$ ) is considered  $\emptyset \subseteq \text{All Sets}$

Complement of B relative to A, (or the difference  $A-B$ )

$\{x \mid x \in A \text{ AND } x \notin B\}$ ,  
or difference  $A-B$ .

## Commutativity & Associativity

- Commutativity  $A \cup B = B \cup A$  (order of args)
- Associativity  $(A \cup B) \cup C = A \cup (B \cup C)$  (order of ops.)

These work because sets are unordered.

## Finite & Infinite Series

Can write unions as,

$$\bigcup_{A \in \mathcal{F}} A = \bigcup_{k=1}^{\infty} A_k$$

Can write intersection as,

$$\bigcap_{A \in \mathcal{F}} A = \bigcap_{k=1}^{\infty} A_k$$