

Basics

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Definition of a Set.

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

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

These work because sets are unordered.

Finite & Infinite Series

Can write unions as,

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

Can write intersection as,

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