Definition: Set

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A **set** is a well-defined collection of distinct objects, called **elements** or **members** of the set.

Notation

- If a is an element of set A, we write $a \in A$
- If a is not an element of set A, we write $a \notin A$
- Sets are typically denoted by capital letters: $A, B, C, ...$
- Elements are typically denoted by lowercase letters: $a, b, c, ...$

Ways to Define Sets

1. **Roster notation**: List all elements between braces
   - Example: $A = \{1, 2, 3, 4, 5\}$
2. **Set-builder notation**: Specify a property that elements must satisfy
   - Example: $B = \{x \in \mathbb{N} : x < 6\}$

Fundamental Properties

- **Distinctness**: Each element appears only once in a set
- **Orderless**: The order of elements does not matter
  - $\{1, 2, 3\} = \{3, 1, 2\}$
- **Well-defined**: For any object, it must be clear whether it is an element of the set or not

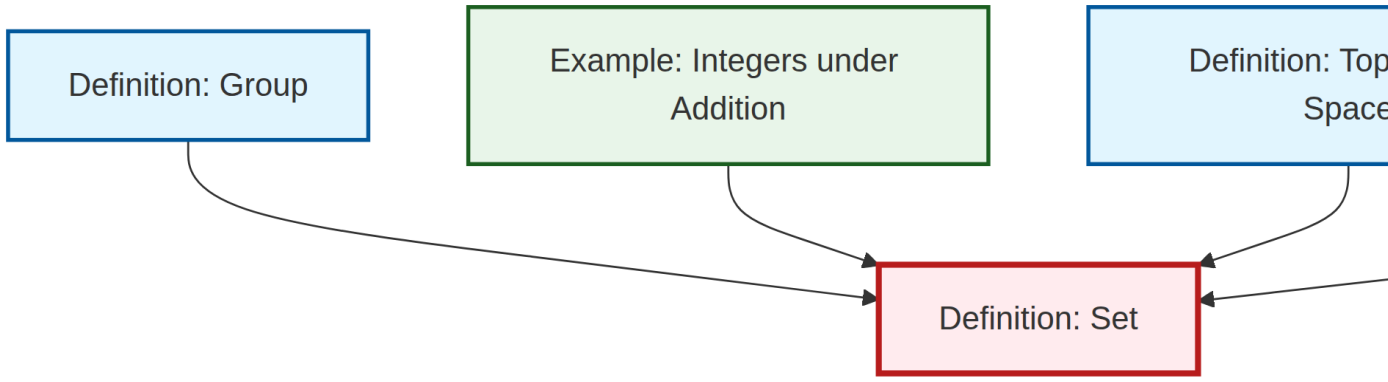
Special Sets

- **Empty set**: The set with no elements, denoted $\emptyset$ or $\{\}$
- **Singleton**: A set with exactly one element

See Also

- Definition: Subset (coming soon)
- Definition: Power Set (coming soon)
- Example: Integers under Addition (uses the concept of sets)

Dependency Graph



Local dependency graph