Set Notation

Symbols

***n*(A)**	Cardinal number of set A	∉	Not an element
A'	Complement of set A	⊈	Not a subset
∈	Element	⊂	Proper Subset
Ø = { }	Empty set or Null set	⊆	Subset
A = B	Equal sets	**|**	Such that
***n*(A) = *n*(B)**	Equivalent sets	∪	Union
∩	Intersection	**U**	Universal set
ℕ	Natural numbers		

Definitions

- **Cardinal numbers**: **number of** distinct **elements** in a set ○ Example: A = {1, 3, 5, 7} ***n*(A) = 4**
- **Complement of set A**: set of all elements in the universal set that are **not in A** ○ Example: U = {1, 2, 3, 4, 5}, A = {1, 3, 5}
  A' = (2, 4}
- **Disjoint sets**: two sets that have **no elements in common** ○ Example: A = {1, 3, 5, 7}, and B = {2, 4, 6, 8} are disjoint sets
- **Element**: **objects in a set** ○ Example: A = {1, 2, 3, 4}
  $\mathbf{1} \in \boldsymbol{A}, \quad \mathbf{2} \in \boldsymbol{A}, \quad \mathbf{3} \in \boldsymbol{A}, \quad \mathbf{4} \in \boldsymbol{A}$

 Empty set (Null set): set that contains **no elements** ○
Example: **Ø =** { }

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- **Equal sets**: two sets that contain **exactly the same elements** ○ Example: A = {2, 3, 4, 5}, B = {2, 3, 4, 5}

  $\boldsymbol{A = B}$

- **Equivalent sets**: two sets that contain the **same number of elements** ○ Example: A = {1, 2, 3}, B = {2, 3, 4} $\boldsymbol{n(A) = n(B)}$

- **Finite sets**: sets whose **cardinality is a whole number** ○ Example: A = {3, 5, 7, 9, 11}

  $\boldsymbol{n(A) = 5}$

- **Infinite sets**: sets whose **cardinality is infinite** ○ Example: A = {1, 2, 3, 4, ...}

  $\boldsymbol{n(A) = \infty}$

- **Intersection**: the set of **elements common to both sets**
  ○ Example: A = {1, 2, 3, 6}, B = {2, 4, 6}

  $\boldsymbol{A \cap B = \{2, 6\}}$

- **Natural numbers**: {1, 2, 3, 4, 5, ...} ○ Counting numbers

- **Not an element**: objects that are **not in a set** ○ Example: A = {1, 2, 3, 4}

  $\boldsymbol{7 \notin A}$

 Not a subset: A is not a subset of B if **at least one element** of A **is not** an element of B ○ Example: A = {1, 2, 3}, B = {1, 3, 5, 7}

  $\boldsymbol{A \not\subseteq B}$

 Proper subset: A is a subset of B and **A is not equal to B**
○ Number of proper subsets for a set with n elements
  ▪ $\boldsymbol{2^n - 1}$ ○ Example: If B = {1, 4, 5}, then all the proper subsets of B are:

  $\{\ \} \subset \boldsymbol{B}, \{\boldsymbol{1}\} \subset \boldsymbol{B}, \quad \{\boldsymbol{4}\} \subset \boldsymbol{B}, \quad \{\boldsymbol{5}\} \subset \boldsymbol{B}, \quad \{\boldsymbol{1,4}\} \subset \boldsymbol{B},$
  $\{\boldsymbol{1,5}\} \subset \boldsymbol{B}, \ \{\boldsymbol{4,5}\} \subset \boldsymbol{B}$

- **Roster method**: **list of the elements** in a set inside a pair of braces { } ○ Example: {Monday, Tuesday, Wednesday} or {1, 2, 3, 4}

- **Set**: **collection of objects**

- **Subset: every element** in the first set is also an element in the second set ○ number of subsets for a set with n elements
  - $\boldsymbol{2n}$

  ○ Example: If A = {5, 6, 7}, then all the subsets of A are:

  $\{\,\} \subseteq \boldsymbol{B}, \{\mathbf{5}\,\} \subseteq \boldsymbol{B}, \quad \{\mathbf{6}\,\} \subseteq \boldsymbol{B}, \quad \{\mathbf{7}\,\} \subseteq \boldsymbol{B}, \quad \{\mathbf{5{,}6}\,\} \subseteq \boldsymbol{B},$
  $\{\mathbf{5{,}7}\,\} \subseteq \boldsymbol{B}, \ \{\,\mathbf{6{,}7}\,\} \subseteq \boldsymbol{B}, \ \{\mathbf{5{,}6}, \mathbf{7}\,\} \subseteq \boldsymbol{B}$

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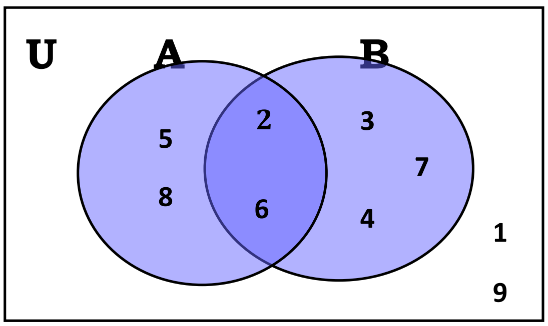
- **Union**: the set of elements that are **in set A, or set B, or both sets A and B** ○ Cardinal number of the union of two finite sets
  - $\boldsymbol{n(A \cup B) = n(A) + n(B) - n(A \cap B)}$

  ○ Example: A = (1, 2}, B = {2, 3, 4}

  $\boldsymbol{A} \cup \boldsymbol{B} = \{\mathbf{1{,}2}, \mathbf{3}, \mathbf{4}\}$

- **Universal set**: set that contains **all the elements being considered**

- **Venn diagram**: universal set is represented by a region inside a rectangle, while subsets within the universal set are represented by circles ○ Example:



U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {2, 5, 6, 8}, B = {2, 3, 4, 6, 7}

$\boldsymbol{A} \cup \boldsymbol{B} = \{\mathbf{2}, \mathbf{3}, \mathbf{4}, \mathbf{5}, \mathbf{6}, \mathbf{7}, \mathbf{8}\}$ $\boldsymbol{A} \cap \boldsymbol{B} = \{\mathbf{2}, \mathbf{6}\}$

A' = {1, 3, 4, 7, 9} **B' = {1, 5, 8, 9}**

- **Word description**: **words** used to describe a set ○ Example: Set A is the set of days of the week.

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