Hierarchy of Sets

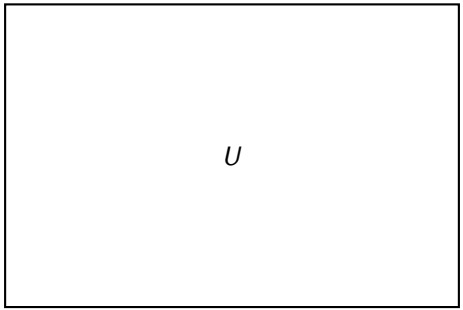
Data Science and A.I. Lecture Series

Bindeshwar Singh Kushwaha

PostNetwork Academy

Universal Set (U)

- The universal set (U) contains all elements under consideration in a specific context.



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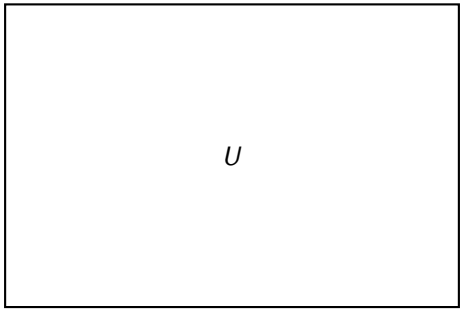
- Example 1: If studying numbers, $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$.



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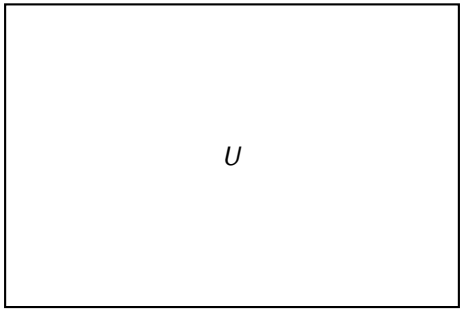
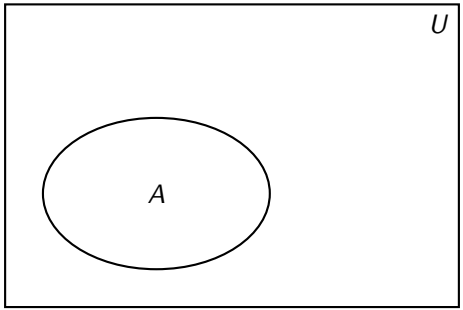
- Example 2: If studying letters, $U = \{\text{a, b, c, ..., z}\}$.



Subset ($A \subseteq U$)

- A set A is a subset of U if all elements of A are also in U.



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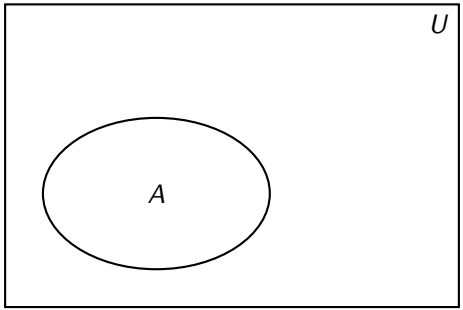

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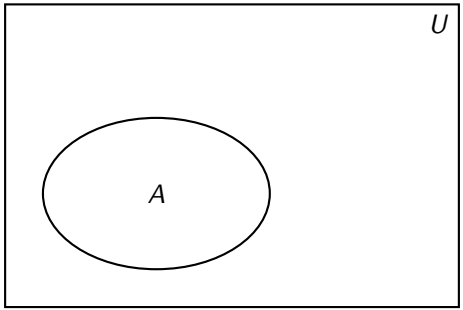
- Example 2: $B = \{\text{a, e, i, o, u}\}$, $U = \{\text{a, b, c, ..., z}\}$, then $B \subseteq U$.



Proper Subset ($A \subset B$)

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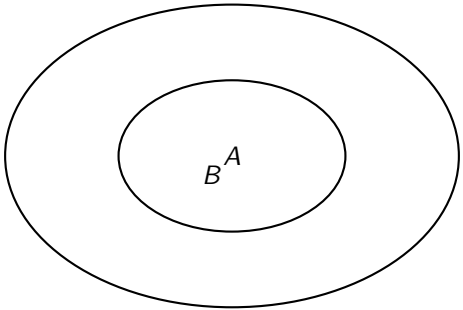

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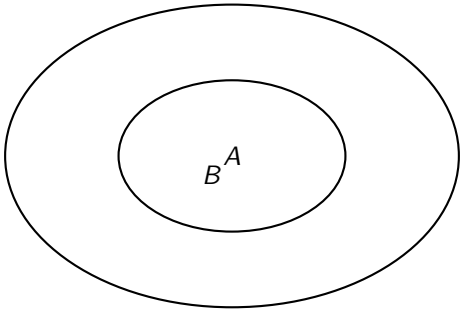

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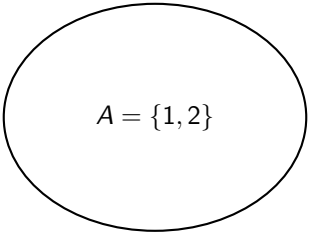

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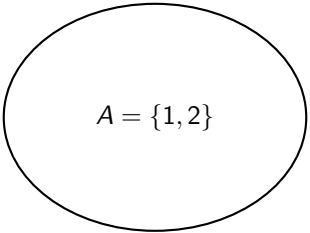

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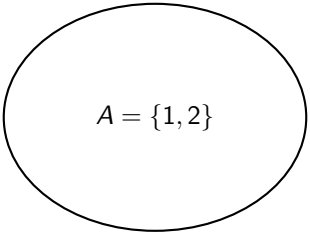
- Example: If $A = \{1, 2\}$, then:
$$P(A) = \{\emptyset, \{1\}, \{2\}, \{1, 2\}\}$$
- If $A = \{a, b, c\}$, then $P(A)$ contains $2^3 = 8$ subsets:
$$P(A) = \{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}.$$



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- Subset ($A \subseteq U$): A set contained within another set.
- Proper Subset ($A \subset B$): A subset that excludes at least one element of the parent set.
- Power Set ($P(A)$): The set of all subsets of a given set.

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