

2.1) 1) Definition (Unordered Collection of objects)

2) object = element.

3) element \rightarrow lower (Small) letter x, y, z, \dots

4) Set \rightarrow Upper (Capital) A, B, C, \dots, S, \dots

5) $x \in S$ $x \notin S$
 \downarrow \downarrow
 belongs not
 to belongs
 to

6) Set Contains element.

13) Power Set = Set of all subsets.

7) $A = B$ iff $A \subseteq B$ and $B \subseteq A$

8) $A \subseteq B \Leftrightarrow \forall x \in A \Rightarrow x \in B$

9) any set Subset of itself " $S \subseteq S$ "

10) Empty Set $\Phi = \{ \}$ Null $\subseteq A$

11) Cardinality (Order) of any set = $|A|$

12) Notation $\left\{ \begin{array}{l} = \text{Number of elements in } A. \\ \text{List element} = \{1, 2, 3\} \\ \text{Set builder} = \{x \mid x \in \mathbb{Z}, 1 \leq x \leq 3\} \end{array} \right.$

$$A = \{1, 2, 3\} \Rightarrow |A| = 3$$

$$P(A) = \{\{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, A, \emptyset\}$$

$$|P(A)| = 2^{|A|} = 2^3 = 8$$

Sets ^{ch1} 2.1-2.4

Logic ^{ch1} 1.1-1.6

Integer ^{ch1}

Relation ^{ch9}

- 1) Definition
- 2) Representation
- 3) Notation

- 1) \sim
- 2) \sim
- 3) \sim

- 1) GCD
- 2) LCM ^{4.1}
- 3) Div. ^{4.2}
- 4) Mod

- 1) Defn
- 2) Rep. ^{9.1}
- 3) Equiv ^{9.11}

- 4) Equality
- 5) operations
- 6) Proofs

- 4) Equivalence
- 5) \sim
- 6) \sim
- 7) Quantifiers
- 8) Rule of Inference

Induction ^{4.5}

4) Operation

Math Induct. ^{5.1, 5.2}

Graph Theory
1) 10.1

Set:

1) Define: Unordered Collection of objects.

$$A = \{1, 2, 4\} = \{4, 1, 2\}$$

$$\{1, 1, 3, 4, 4, 5\} = \{1, 3, 4, 5\} \quad \begin{array}{l} \text{No duplication} \\ \text{(Repeated)} \end{array}$$

Capital letter A, B, C, D, S, T, ...

element lower small x, y, z, ...

belongs to \in

Not belongs to \notin

$$B = \{1, 4, 9\}$$

$$1 \in A$$

$$5 \notin A$$

$$B = \{x^2 : x \in \mathbb{Z}, 1 \leq x \leq 3\}$$

$$A = \{1, 2, 3, 4, 5\}$$

$$A = \{x : x \in \mathbb{Z}, 1 \leq x \leq 5\}$$



$$U = \{1, 2, 3, \dots, 10\}$$

$$|P(A)| = 2^{|A|}$$

$$A = \{1, 2, 3, 4\}$$

$$\Rightarrow |A| = 4 \Rightarrow |P(A)| = 2^4$$

$$B = \{2, 4\}$$

$$C = \{3, 4, 5\}$$

$$D = \{6, 8\}$$

$$E = \{8, 10\}$$

$$F = \{2, 4\}$$

Power set of A

Set of all sets subset of A

$$P(B) = \{\{2\}, \{4\}, B, \phi\}$$

$$1 \in A$$

$$5 \notin A$$

$$B \subseteq A$$

$$B \not\subseteq C \rightarrow 2 \in B \text{ but } 2 \notin C$$

$$B = F : [B \subseteq F \text{ and } F \subseteq B]$$

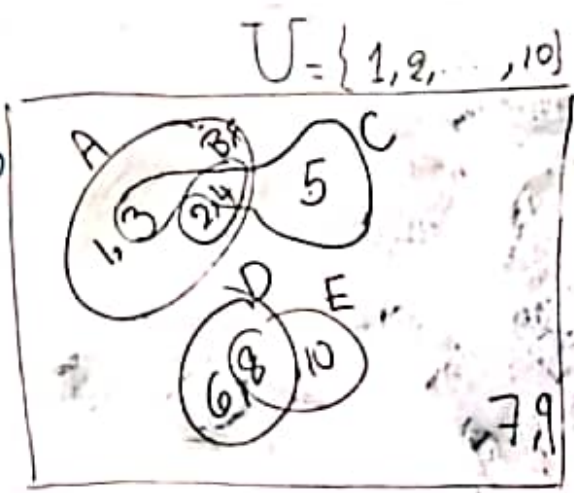
$$P(C) = \{\{3\}, \{4\}, \{5\}, \{3, 4\}, \{3, 5\}, \{4, 5\}, C, \phi\}$$

empty set

$$\phi = \{ \} \Rightarrow |\phi| = 0$$

$$\phi \subset \text{Any Set}$$

$$S' \subseteq S \quad A \subseteq A$$



Cardinality of Set :
(order)

$$|A| = 4$$

$$|B| = 2$$

$$|C| = 3$$