

Lecture 1

Books

- Lipschutz (Text Book)
- Kenneth H. Rosen (Reference)

Syllabus:

1. Set Theory.
2. Functions.
3. Relations. Midterm
4. Propositional Logic
5. Predicate Logic
6. Group Theory

Topic: Set Theory

Set is ^{unordered} a collection of objects

→ Order is irrelevant

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

$$B = \{3, 2, 1\}$$

Block Points:

- Unordered elements are bounded by $\{$ braces $\}$ but the ordered collection of elements are bounded by $($ parenthesis $)$

$A = B$ equal set.

$$C = \{1, 1, 1, 1, 2, 3\}$$

equal sets

$$A = B = C$$

- That's why functions, have parenthesis

$$(1, 2) \neq (2, 1)$$

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

$N =$ Natural Number Set. $= \{0, 1, 2, 3, \dots\}$ or $\{1, 2, 3, \dots\}$

(Depends on Book)

\mathbb{N}

$\mathbb{Z} = \{\dots, -2, -1, 0, 1, 2, \dots\}$ (Negative + Positive integer & zero)

$\mathbb{Z}^+ = \{1, 2, 3, \dots\}$ (Positive integers)

$\mathbb{Z}^- = \{-1, -2, \dots\}$ Negative integers

$\mathbb{Q} =$ Rational No. $\frac{p}{q}$

\mathbb{C} = Complex Numbers.

- Null Set, Subset, Proper Subset, Belongs to Property, Exclusion
- Inclusion Property.

- $\boxed{\mathbb{N} \subseteq \mathbb{Z} \subseteq \mathbb{Q} \subseteq \mathbb{R} \subseteq \mathbb{C}}$

- $\emptyset \subseteq A$; Any Set, $\subseteq U$ (Universal Set)

Q1. Find whether the following are True or False.

a. $\{1, 2\} \subseteq \{1, 2, 2\}$ T

b. $\{1, 2\} \in \{1, 2, 2\}$ F

c. $\emptyset \in \{1, 2, 2\}$ F

d. $\emptyset \subseteq \{1, 2, 2\}$ T

e. $\emptyset \in \emptyset$ F

f. $\emptyset \subseteq \emptyset$ True.

g. $\emptyset \in \{\emptyset\}$ True.

h. $\emptyset \subseteq \{\emptyset\}$ True.