Year 5. Session 109 (2009-2010 school year).
Set Theory.

Sets

Notation:

x ∈ A - element x belongs to a set A

x ∉ A - element x does not belong to a set A

A = {x} - set A consists of elements x

Examples:

$A = \{1, -3, 15, 28\}$

$A = \{pen, pensil, erazer\}$

$A = \{all\ fish\ in\ the\ ocean\}$

$A = \{x | x \in \mathbb{Z}, x > 0\ (all\ natural\ positive\ numbers)\}$

$A = \{all\ circles\ on\ the\ plain\ of\ radious\ 1\}$

Notation:

$\mathbb{R} - set\ of\ all\ real\ numbers$

$\mathbb{Q} - set\ of\ all\ rational\ numbers$

$\mathbb{Z} - set\ of\ all\ integer\ numbers$

$\mathbb{N} - set\ of\ all\ natural\ numbers$

Notation:

∅ - empty set.

Examples of empty sets:

Subsets

Def: **B ⊂ A** - Set B is a subset of A if $\forall x \in A$ it is true that $x \in B$.

Notation: I - universal set.

Intersection of Sets

Def: intersection of sets $A, B, C, \ldots$ is a set that contain those and only those elements that belong to each of the sets $A, B, C, \ldots$

Notation: $A \cap B$ or AB

$A \cap B = \{x | x \in A \text{ and } x \in B\}$

Properties:
- $A \cap B = B \cap A$
- $(A \cap B) \cap C = A \cap (B \cap C)$
- $A \cap \emptyset =$
- $A \cap I =$
- $A \cap A =$

Addition (union) of Sets

Def: sum (union) of sets $A, B, C, \ldots$ is a set that contain those and only those elements that belong to at least one of the sets $A, B, C, \ldots$

Notation: $A \cup B$ or $A + B$

$A \cup B = \{x | x \in A \text{ or } x \in B\}$

Properties:
- $A \cup B = B \cup A,$ $A + B = B + A$
- $(A \cup B) \cup C = A \cup (B \cup C).$ $(A + B) + C = A + (B + C)$
- $A \cup \emptyset =$ $A + \emptyset =$
- $A \cup I =$
- $A \cap A =$ $A + A =$
- $A \cap (B \cup C) =$ $A(B + C) =$

Subtraction of Sets

Def: difference of sets A and B is a set that contain those and only those elements that belong to A, but don't belong to B

Notation: $A \setminus B$

$A \setminus B = \{x | x \in A \text{ } and \text{ } x \notin B\}$

Complement of a Set

Def: a complement of a set A is a set that contain those elements that don't belong to A.

Notation: $\bar{A}$

$\bar{A} = \{x | x \in I \text{ } and \text{ } x \notin A\}$