[11-04-02-T11]
Sets

DEFINITION 1. If object a is an element in set A, we write $a \in A$. If a is not an element of A, we write $a \notin A$.

DEFINITION 2. When two sets A and B consist of the same elements, we say that they are *equal* and we write $A = B$. That is, $A = B$ means that $x \in A \Longleftrightarrow x \in B$.

DEFINITION 3. Let S be a set. Any set A, each of whose elements is in S is said to be *contained* in S and is called a *subset* of S. We write $A \subseteq S$. That is, $A \subseteq S$ means $x \in A \Longrightarrow x \in B$.

DEFINITION 4. Let A be a subset of S. If $A \neq S$, then A is called a *proper subset* of S and we write $A \subset S$. That is, $A \subset S$ means $(x \in A \Longrightarrow x \in S) \bigwedge (A \neq S)$.

DEFINITION 5. Let A be a proper subset of S with S consisting of elements of A together with at least one element not in A. Those elements of S that are not in A constitute another proper subset of S called the *complement* of A, denoted by $\overline{A}$ or A'.

DEFINITION 6. The empty or null set $\emptyset$ is the set having no members.

DEFINITION 7. If a nonempty set U is a set whose subsets are under consideration, we call U the *universal set*.

DEFINITION 8. Let A and B be given sets. The set of all elements that belong to both A and B is called the *intersection* of A and B, denoted by $A \bigcap B$. That is, $A \bigcap S$ means $x \in A \bigwedge x \in B$.

DEFINITION 9. Let A and B be given sets. The set of all elements that belong to A alone or to and B alone or to both A and B is called the *union* of A and B, denoted by $A \bigcup B$. That is, $A \bigcup B$ means $x \in A \bigvee x \in B$.

DEFINITION 10. Sets A and B are called *disjoint* if they have no element in common. That is, $A \bigcap B = \emptyset$.

DEFINITION 11. The *difference* $A - B$, in that order, of two sets A and B is the set of all elements of A that dio not belong to B. That is, $A - B$ means $x \in A \bigwedge x \notin B$.