Def A **set** is a collection of distinct, unordered elements

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

curly braces

Ex $\mathbb{N} = \{0,1,2,\dots\}$ natural numbers

$\mathbb{Z} = \{\dots,-1,0,1,2,\dots\}$ integers

$\mathbb{R}$: The set of real numbers

We denote membership in a set using $\in$:

$3 \in \mathbb{N}$ (3 is an elem. of the set of natural numbers)

$2 \in \{1,2,3\}$

$-1 \notin \mathbb{N}$ (-1 is **not** in the set of natural numbers)

The **empty set** $\emptyset$ is the set containing no elements

The cardinality (or size) of a set is the number of elements in the set.
We denote the cardinality of S as:
(i) $|S|$
(ii) $n(S)$ (the book uses this notation)

Ex $n(\{1,2,3\}) = 3$

Set Operations.

Let A and B be sets.
(i) Union: $A \cup B$ is the set containing every elem. in A or B (or both)
↑ operator (like addition)

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

Ex $A = \{1,2,3\}$, $C = \{3,4,5\}$
$A \cup C = \{1,2,3,4,5\}$
3 occurs only once
$|A \cup C| = 5$ $(n(A \cup C) = 5)$

Set Intersection The intersection of two sets A and B is the set of elements that belong to both A and B. We denote: $A \cap B$

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

$A \cap C = \{3\}$

Ex $A = \{1, 2, 3\}$, $B = \{4, 5, 6\}$

$A \cap B = \emptyset$ (the empty set)

Set Complementation

(i) Let $\mathcal{U}$ be our universal set (the set containing every thing of interest)

(ii) Let $\mathcal{U}$ be our universal set, and let $A \subset \mathcal{U}$ (all of A's elements are in $\mathcal{U}$)

The complement of A, denoted A' (or $\bar{A}$, or A^C), is the set containing everything in $\mathcal{U}$ that is not in A.

Ex Let $U = \{1, 2, 3, 4, 5\}$ (universal set)

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

So $A' = \{1, 4, 5\}$

$n(A) = 2$

$n(A') = 3$

$n(U) = 5$

Observe For finite sets

$n(A') = n(U) - n(A)$

Problems 1, 3, 4-6