

1.1 Describing a Set

(Def) A **set** is a collection of objects (called **elements** or **members**).

e.g., The elements of a football team are the players.

(Note) It's customary to use capital letters (such as A, B, C, S, X, Y) to designate sets and lower case letters (such as a, b, c, s, x, y) to represent elements of sets.

(Notation) " \in " is used to mean "element of",
so $\left\{ \begin{array}{l} \text{if } a \text{ is an elm. of a set } A, \text{ we write } a \in A \\ \text{if } a \text{ is not an elm. of a set } A, \text{ we write } a \notin A \end{array} \right.$

Ways to describe a set

$\boxed{1}$ If a set S consists of a small number of elm.s
 $\implies S = \{\text{elements of } S\}$.

e.g., the set B of positive even $\# < 10 : B = \{ \quad \quad \quad \}$

(1.1 cont.)

2 Some sets contain too many elem.s: use the "3 dot notation".

e.g., $X = \{1, 3, 5, \dots\}$ is the set of

$Y = \{2, 4, 6, \dots, 88\}$ is the set of

3 Sets without elements: $\emptyset = \{\}$ = the **empty set** or **null set** or **void set**.

e.g., the set of all real numbers x s.t. $x^2 < 0$ is empty.

4 $S = \{\text{domain: property}\}$

$S = \{x : p(x)\} = \{x \mid p(x)\}$ means S consists of all those elements x satisfying some condition $p(x)$ concerning x .

Note "x" refer to a real $\neq x$.

e.g., $A = \{1, 4, 7, 6, 9, 11, 12, 13\}$

$B = \{x \in A : x \text{ is a prime } \neq\} =$

(1.1 cont.)

$\boxed{5}$ $S = \{\text{formula: domain or property}\}$

e.g., $A = \{x^2 : x \text{ is an integer}\} =$

<Notation> $|S| =$ the # of elements in S

= **cardinal#** or **cardinality** of S .

e.g., $A = \{0, 1, 2, 3\}, B = \{\emptyset, 2, \{1, 2\}, \{3, 4, 5\}\}$

$|A| =$

$|B| =$

$|\emptyset| =$