Section 2-1 **Applied Topics in Mathematics** Vocabulary

Set – is a collection of objects, which are called **elements** or **members** of the set.

A set is well defined if its contents can be clearly determined. The set of U.S. presidents is well defined. The set of the three best movies are not well defined because the word best is interpreted differently by different people.

Braces { } - are used to list the elements of a set.

This is called **Roster Form** A={1,2,3,...}

The symbol for element is 1 is an element of set A.

Example 1

Express the following in roster form

Set A is the set of natural number less than 5.

Set B is the set of natural numbers less than or equal to 7 b)

Set P is the set of planets in Earth's solar system.

C) Set P is the set of planets in Editil's 30141 3,522

P= & Mars, Juptler, Uranus, Mercury, Venus,

Saturation between 4 and 9, inclusive.

Set Builder Notation – D =
$$\{x \mid condition(s)\}$$
Set D is all elements x

Natural numbers= N

Example
$$E = \{x \mid x \in N \text{ and } x > 10\}$$

Exmaple

Write set B = $\{1, 2, 3, 4, 5\}$ in set-builder notation $B = \{x \mid x \in \mathbb{N} \text{ and } x \leq 5\}$

Example

Write set C = {North America, South America, Europe, Asia, Australia, Africa, Antarctica} in set-builder notations.

Example

Write set A = $\{x \mid x \in \mathbb{N} \text{ and } 2 < x < 8\}$ in roster form.

A set is **finite** if it either contains no elements or the number of elements in the set is a natural number. $A=\{2,4,6,8\}$

A set is **infinite** if it is not finite.

Set A is **equal** to set B, symbolized by A = B, if set A and set B contain exactly the same elements.

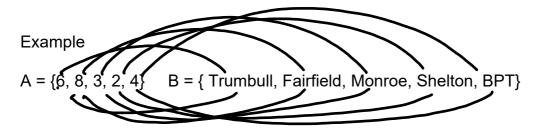
A= & a, b, c} B= & c, b, a}

The **cardinal number** of set A, symbolized by n(A), is the number of elements in set A.

Example: set $B = \{England, Brazil, Japan\}$ has a cardinal number of 3; that is, n(B)=3.

Set A is equivalent to set B if and only if n(A) = n(B)

One to one correspondence when every element in set A can be matched with exactly one element of set B and every element in set B can be matched with exactly one element in set A.



The set that contains no elements is called the $\frac{\text{null set}}{\text{or }}$ or the $\frac{\text{empty set.}}{\text{or }}$ It is symbolized by $\{\}$ or \bigcirc

Note that { \infty } is not the empty set.

A universal set, symbolized U is a set that contains all the elements for any specific discussion.

For example, the universal set for a particular problem is defined as $U = \{1,2,3,4,5,...,10\}$, then only the natural numbers 1 through 10 may be used in that problem.

PRACTICE THE SKILLS

In Exercises 13–18, determine whether each set is well defined.

- 13. The set of the best books NOT
- 14. The set of the easiest courses at your school 407
- 15. The set of states that have a common border with Kansas
- 16. The set of the four states in the United States having the largest areas
- 17. The set of astronauts who walked on the moon



In Exercises 25–34, express each set in roster form. You may need to use a world almanac or some other reference source.

- 25. The set of states in the United States whose names begin with the letter M $m = \sum_{i=1}^{n} m_i + m_i +$
- 30. The set of states west of the Mississippi River that have a common border with the state of Florida
- 31. The set of football players over the age of 70 who are still playing in the National Football League
- 32. The set of states in the United States that have no common Hw, Abska border with any other state