

Section 4.1

Sets. Operations with Sets

Example#1 Let A and B be two sets of elements: $A = \{a, b, c\}$, $B = \{a, b, c, d\}$

$a \in A$ because a is an element of A

$d \notin A$ because d is not an element of A .

$$\{a, b, c\} = \{b, a, c\}$$

Definition $A \subset B$ **A is included in B** if any element of A is also in B .

Example #2 $\{a, b, c\} \subset \{a, b, c, d\}$

$$\{1, 2, 3\} \not\subset \{1, 2\}$$

Operations with sets

\cup - "**union**" $A \cup B = \{x \mid x \in A \text{ or } x \in B\}$

Examples:

\cap - "**intersection**" $A \cap B = \{x \mid x \in A \text{ and } x \in B\}$

Examples:

The Empty Set \emptyset - the set with no elements

Definition A number a is less than a number b ($a < b$) if a is to the left of b on the number line.

Exercise #1 Write equivalent statements:

a) $2 \leq 3$ _____

b) $2 > y$ _____

c) $5 > x \geq -2$ _____

d) $-4 < -2$ _____

Intervals of real numbers

$$[a, b] = \{x \mid a \leq x \leq b\}$$

$$(a, b) = \{x \mid a < x < b\}$$

$$[a, \infty) = \{x \mid x \geq a\}$$

$$(a, \infty) = \{x \mid x > a\}$$

$$(-\infty, a] = \{x \mid x \leq a\}$$

$$(-\infty, a) = \{x \mid x < a\}$$

Exercise #2 Do the following operations and graph the solution set:

a) $[-2, 5] \cup [-3, 1]$

d) $(-\infty, 2) \cup [0, \infty)$

b) $[-2, 5] \cap [-3, 1]$

e) $(-4, -1) \cap (-1, 2)$

c) $(1, \infty) \cap (-3, 4)$

Exercise #3 Graph the following sets and express them using interval notation:

a) $\{x \mid x \leq -2\}$

b) $\{x \mid 2 < x \leq 3\}$

c) $\{x \mid -3 \geq x \geq -7\}$