DISCRETE MATH

Symbols

$x \in X$	x is a member of X
$\{\}, \phi$	The empty (or null) set
$S \subseteq T$	S is a subset of T
$S \subset T$	S is a proper subset of T
(a,b)	Ordered pair
$P^{(S)}$	Power set of S
$(a_1, a_2, \ldots, a_n)$	n-tuple
$A \times B$	Cartesian product of A and B
$A \cup B$	Union of A and B
$A \cap B$	Intersection of A and B
$\forall x$	Universal qualification for all x; for any each x
$\exists y$	Uniqueness qualification there exists y

A binary relation from A to B is a subset of $A \times B$.

Roster Notation

List elements of a set inside braces {}, separated by commas.

The Set of **Natural Numbers:** $\{1, 2, 3, 4, 5, \ldots\}$
The Set of **Whole Numbers:** $\{0, 1, 2, 3, 4, 5, \ldots\}$
The Set of **Integers:** $\{\ldots, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, \ldots\}$

The Set of **Rational Numbers:** $\left\{ \frac{a}{b} \middle| a \text{ and } b \text{ are integers and } b \neq 0 \right\}$

$\in$ - is an element of

$\notin$ - is not an element of

Roster Notation

$$3 \in \{1, 2, 3, 4, 5\}$$

$$\frac{1}{3} \notin \{1, 2, 3, 4, 5\}$$

$$50 \in \{x | x \text{ is an integer}\}$$

$$-5 \in \{x | x \text{ is a rational number}\}$$

Example #1

Let G is the set of whole Number < 10

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, ...

$G = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

Example #2

Let x is the set of all odd Numbers < 12

$X = \{1, 3, 5, 7, 9, 11\}$

Example #3

Which of the following is the set of odd whole numbers less than 10?

- $C = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$
- $D = \{0, 2, 4, 6, 8\}$
- $E = \{1, 3, 5, 7, 9\}$
- None of the above.

Equality of Sets

$A = \{1, 3, 5, 7\}$

$B = \{3, 7, 1, 5\}$

is $A = B$?

$A = B$ why all elements of A is the same as B

Example # 4 Let R all set of whole Number < 5

Let $S = \{4, 0, 2, 3, 1\}$ are they equal?

Solution

$R = \{0, 1, 2, 3, 4\}$ $S = \{4, 0, 2, 3, 1\}$ $R = S$

Examine Set whether finite or infinite

infinite

(a) The set $\{\ldots, -2, -1, 0, 1, 2, 3, 4, \ldots\}$

The list goes forever and has all the counting numbers and all the integers.

(b) The set of all Natural numbers between (0, 5)

$\{1, 2, 3, 4, 5\}$

Finite Set