SET THEORY

❖ What is a Set?

➔ A set is a group of **"objects"**.

➔ A collection of well-defined objects is called set. (Well defined means we must be able to decide that the object will be included in our collection on not).

➔ we denote any set by upper case A, B, C, ...

➔ Objects in the set are called elements or members.

➔ **Example:**

- People in a class: {Alice, Bob, Chris}
- Classes offered by a department: {CS 101, CS 202, ...}
- Colors of a rainbow: {red, orange, yellow, green, blue, purple}
- States of matter {solid, liquid, gas, plasma}
- States in the US: {Alabama, Alaska, Virginia, ...}
- Sets can contain non-related elements: {3, a, red, Virginia}

➔ Although a set can contain (almost) anything, we will most often use sets of numbers.

➔ **Example:**

- All positive numbers less than or equal to 5: {1, 2, 3, 4, 5}
- A few selected real numbers: {2.1, π, 0, -6.32, e}

➔ **Important Sets:**

- **N** = {0,1,2, 3, ...}, the set of natural numbers, non-negative integers, (occasionally IN)
- **Z** = {..., -2, -1, 0, 1, 2,3, ...), the set of integers
- **Z+** = {1,2, 3, ...} set of positive integers
- **Q** = {p/q | p € Z, q € Z, and q≠0}, set of rational numbers
- **R**, the set of real numbers

➔ **Note:** Real number are the numbers that can be represented by an infinite decimal representation, such as 3.4871773339.... The real numbers include both rational, and irrational numbers such as π and the and can be represented as points along an infinitely long number line.