DISCRETE STRUCTURE AND THEORY OF LOGIC

KCS-303

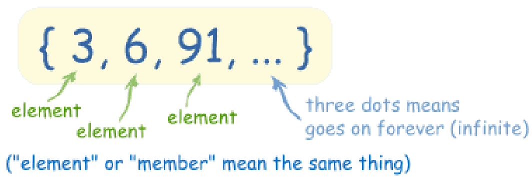
SET THEORY

PART-I

Set-A collection of well defined objects (elements) is called a set.

Notation

There is a fairly simple notation for sets. You simply list each element, separated by a comma, and then put some curly brackets around the whole thing.



The curly brackets { } are sometimes called "set brackets" or "braces". This is the notation for the two previous examples:

{Socks, shoes, watches, shirts,…}

{Index, middle, ring, pinky}

- The first set **{socks, shoes, watches, shirts, ...}** we call an **infinite set**,
- The second set **{index, middle, ring, pinky}** we call a **finite set**.

But sometimes the "..." can be used in the middle to save writing long lists:

Example:

the set of letters:

{a, b, c, ..., x, y, z}

In this case it is a **finite set** (there are only 26 letters, right?)

Numerical Sets

So what does this have to do with mathematics? When we define a set, all we have to specify is a common characteristic. Who says we can't do so with numbers?

Set of even numbers: { 2, 4,...}

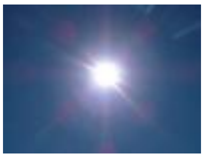
Set of prime numbers: {2, 3, 5, 7, 11, 13, 17,..}
Positive multiples of 3 that are less than 10: {3, 6, 9} and the list goes on. We can come up with all different types of sets. There can also be sets of numbers that have no common property; they are just defined that way. For example:

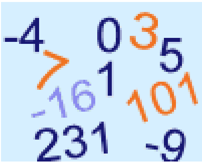
{2, 3, 6, 828, 3839, 8827}

{4, 5, 6, 10, 21}

{2, 949, 48282, 42882959, 119484203}

Universal Set—

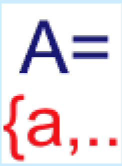




At the start we used the word "things" in quotes. We call this the **universal set**. It's a set that contains everything. Well, not *exactly* everything. **Everything that is relevant to your question.**

So far, all I've been giving you in sets are integers. So the universal set for all of this discussion could be said to be integers. In fact, when doing Number Theory, this is almost always what the universal set is, as Number Theory is simply the study of integers.

Some More Notations



When talking about sets, it is fairly standard to use Capital Letters to represent the set, and lowercase letters to represent an element in that set.