

Mathematical Economics *V Semester*

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SET THEORY

The theory of sets was developed by German mathematician Georg Cantor (1845-1918). He first encountered sets while working on "Problems on Trigonometric Series". SETS are being used in mathematics problem since they were discovered.



Introduction

- ❖ Sets are used to define the concepts of relations and functions.
- ❖ The study of geometry, sequences, probability, etc. requires the knowledge of sets.
- ❖ Studying sets helps us categorize information.
- ❖ It allows us to make sense of a large amount of information by breaking it down into smaller groups.



What is Set?

Set is basically a **collection** of different things having some common property. It could be anything like:

Set of number of states in a country.

Set of different wild animals

Set of clothes

Set of no. of students in a class

Collection of object of a particular kind, such as, a pack of cards, a crowd of people, a cricket team etc. In mathematics of natural number, prime numbers etc.



A Set is a well defined collection of objects

- *Elements of a set are synonymous terms.*
- *Sets are usually denoted by capital letters.*
- *Elements of a set are represented by small letters.*



Definition of Sets

A SET is a proper or well defined collection of different objects. It could be anything like a set of 10 natural numbers less than 11. So the numbers will be 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 in this set.

Here all the numbers have their own identity if we see them identically but collectively they make a set of natural numbers less than 11.i.e., {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}.



Definition:

A set is any collection of objects specified in such a way that we can determine whether a given object is or is not in the collection.

- ❑ In other words A set is a collection of objects.
- ❑ These objects are called elements or members of the set.

The following points are noted while writing a set.

- ❑ Sets are usually denoted by capital letters A, B, S, etc. The elements of a set are usually denoted by small letters a, b, t, u, etc .

Examples: $A = \{a, b, d, 2, 4\}$

$B = \{\text{math, religion, literature, computer science}\}$



There are two ways to represent sets

- *Roster or tabular form.*
- *Set-builder form.*



ROSTER OR TABULAR FORM

In roster form, all the elements of set are listed, the elements are being separated by commas and are enclosed within brackets {}.

*e.g. : set of 1,2,3,4,5,6,7,8,9,10.
{1,2,3,4,5,6,7,8,9,10}*



SET-BUILDER FORM

In set-builder form, all the elements of a set possess a single common property which is not possessed by an element outside the set.

e.g. : set of natural numbers k

$$k = \{x : x \text{ is a natural number}\}$$



EXAMPLE OF SETS IN MATHS

N : the set of all natural numbers

Z : the set of all integers

Q : the set of all rational numbers

R : the set of all real numbers

Z⁺ : the set of positive integers

Q⁺ : the set of positive rational numbers

R⁺ : the set of positive real numbers.



Symbols of Sets

Notation	Definition
\in	Element of....
\notin	Not an element of....
\subset	Subset of....
$\not\subset$	Not a subset of....
\subseteq	A subset and equal to ...
\cup	Union (all together) 'OR'
\cap	Intersection (Overlap) 'AND'
A'	Not A
\emptyset	Empty set

Thank You

