Pinky Rani
Assistant Professor (Guest Faculty)
Department of Economics
Maharaja College
Veer Kunwar Singh University, Ara
B.A. Economics
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Topic:-Set Theory

1. Introduction
This module introduces you to the theory of sets, ordered pair and Cartesian product. It explains the concepts of relation and function with their economic applications.

Definition:
A Set is a collection of distinct objects. These objects maybe alphabets, numbers,
individuals or any other item. It is different from a general collection of objects and is a well defined collection of objects i.e. the use of the word "set" means that there is also a method to determine whether or not a particular object belongs to the set.
The objects of a set are also termed as its members or elements. All elements of a set are enclosed by { } type of brackets.
For example: if 1, 7, 8 and 3 are elements of a set then they are denoted as {1,7,8,3} in set notation. Here the number of elements in A is given by |A| = 4.
A set can be written either by enumeration or by description.
In an enumeration approach, elements of a set are not infinite or not large. For example if A denotes the set of all positive integers less than 12, A is written as A= {2,4,6,8,10}.
If the number of elements in the set is large then the set is written by its description. For example: the set of all real numbers B can be written as B={x: x is a real number} where elements of set are given a symbol (x) and its description is separated by a colon or a vertical bar.
ϵ indicates membership of an object in a particular set. The negation of this or non membership is often indicated by $x \notin A$ ('x is not in A'). If A={3,7} then $3 \epsilon A$ and $4 \notin A$.
The subset relation $A \subset B$ states that every element of A is also an element of B.
Logically, this would be: if $x \epsilon A$ then $x \epsilon B$. Here $\subset$ represents a proper subset which
excludes the case of A=B. the symbol $A \subseteq B$ implies that A maybe a subset or equal to B.
Given A={2,5} and B={2,3,5,7} then $A \subset B$.
If A is a set then 2A is the number of all subsets of A.
The union and intersection operators form new sets by the following rules;
The set $A \cup B$is defined to be {x: $x \epsilon A$ or $x \epsilon B$} while $A \cap B$ is defined to be {x: $x \epsilon A$ and $x \epsilon B$}. The former implies that x is an element of A or x is an element of B or both A and B while the later implies that x is an element of both A and B. From the above sets A and B, $A \cup B$={2,3,5,7} and $A \cap B$={2,5}.
The difference of two sets A and B is the set of elements in A and not in B. It is also

denoted as A\B. For example: A={3,7,9,8} and B={7,8} then A-B={3,9} Finally, the complement of a set consists of those objects that are not in the given set. It is
also represented by Ac
.For this the concept of universal set needs to be understood.

Concept of Universal set:
Underlying a discussion or argument involving sets is usually a large set called
the universal set or universe of the discourse and is commonly denoted by U. This universe may be implied or stated explicitly. Operations involving union, intersection or complement are understood to be contained in this universe.
For example, if we were discussing real numbers (so that our universe would be the set of real numbers) and mentioned the set A with 3 elements {1,6,8}, it is understood that A' consists of those real numbers not in A.

Null set:
A null set or an empty set is a set that does not contain any element. It is denoted as θ where θ= {}.One should be careful that a set {0} is not a null set since it has a single number zero as its member and is therefore not empty. Moreover a null set is a subset of every set.