[Glossary]

Number System & Set Theory

Subject:	Business Economics
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Paper No. & Title:	Paper – 202 Mathematics for Business Economics
Unit No. & Title:	Unit – 1 Basic Concepts
Lecture No. & Title:	Lecture – 1 Number System & Set Theory

Glossary

Rational Number

Numbers of the type $\frac{p}{q}$ are known as rational numbers. Here p is an integer and q is a positive integer. These numbers are called fractionals also. Their decimal representations are either terminating, repeating or have recurring cycle as we see in:

$$\frac{1}{2} = 0.5 = 0.4999\ldots$$

$$\frac{1}{3} = 0.333\ldots$$

$$\frac{1}{7} = 0.\overline{142857}\,\overline{142857}\ \ldots$$

The collection of rational numbers is denoted by $\mathbb{Q}$.

Irrational Number

Numbers that cannot be represented or put in the form $\frac{p}{q}$, where p is an integer and q a natural number, are called irrational numbers. Their decimal representations are neither terminating nor have repeating or recurring cycle. The numbers $\sqrt{2}$, π and e which occur in many different situations are irrational numbers. The set $\mathbb{R} - \mathbb{Q}$ is the set of all irrational numbers.

Real numbers

All rational numbers as well as all irrational numbers are called real numbers. The collection of real numbers is denoted by $\mathbb{R}$.

Complex Numbers

Numbers $a + ib$ where a and b are real numbers and $i = \sqrt{-1}$ is a new notation for the unknown new entity, having the property

that $i^2 = -1$, are called complex numbers. The collection of complex numbers is denoted by $\mathbb{C}$.

Set

A "set" is simply a well-defined collection of distinct objects.

Union

The union of two sets A and B is denoted by $A \cup B$ and is the new set consisting of all the elements which are either in A or B. Thus,

$A \cup B = \{x \mid x \in A \; or \; x \in B\}$

Intersection

The intersection of two sets A and B is denoted by $A \cap B$ and is the new set consisting of elements which are both in A as well as B. Thus,

$A \cap B = \{x \mid x \in A \; and \; x \in B\}$

Universal Set and Empty Set

The set which contains no element is called an empty set and is denoted by the notation $\emptyset$ called phi. The idea of a universal set is very important. Whenever one is talking of anything one has to keep in mind what is the universal set under consideration. Bertrand Russell was the one who emphasized the need of universal set. He also demonstrated that if you don't specify the universal set of your situation you may create paradoxical statements. Universal set is generally denoted by letter U. Some time context makes it clear as to what is your universal set under consideration.

Complement

The complement of set A is the set of all elements of the universal set U which are not in A. Complement of a set A is denoted by A' or $U \setminus A$ or $\tilde{A}$. Note that that complement of U is $\emptyset$. That is $U' = \emptyset$. And $\emptyset' = U$.

Statement

Mathematical statements or simply statements are having definite truth values. A statement thus is either true or false. Note that Mathematical statements are eternal truths

Market Equilibrium

In economics it is a standard assumption that market equilibrium takes place if and only if there is no excess demand i.e. $\boldsymbol{Q_d - Q_s = 0}$. Where $\boldsymbol{Q_d}$ denotes the quantity demanded and $\boldsymbol{Q_s}$ denotes is the quantity supplied.

Thus the equilibrium condition is

$\boldsymbol{Q_d = Q_s}$