

LIMIT AND CONTINUITY

3.1. Introduction

The concept of limit is the most fundamental concept in differential calculus, a mathematical tool most widely used in economic analysis. When there exists a functional relation between two variables, say x and y , such that $y = f(x)$, one may be interested to know the value y tends to assume when x approaches a specific value. The answer to this question lies in the concept of limit. For example, when x approaches a value, ' a ', y approaches the value, l , then ' l ' is called the limiting value of y or limit of y . In symbol

$$\lim_{x \rightarrow a} y = l$$

This can be read as : the limit of y as x tends to ' a ' is l . For the detailed discussion of limit we need to introduce here several other concepts such as sequence and neighbourhood.

3.2. Sequence

A *sequence* is a function the domain of which is a set of natural numbers. It maps the set of natural numbers into the set of real numbers. To clarify the concept let us recall here our discussion on set analysis. Let R be the set of all x where x can assume the value of any real number and N be the set of all n , where n can assume the values of only natural numbers. Then

$$R = \{x | -\infty < x < \infty\}$$

$$\text{and } N = \{n | n = 1, 2, 3, 4, \dots\}$$

