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Limits Theoremas about Limits

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Abstract: *Limit (Latin: Limes - limit) is one of the most important concepts in mathematics. If the second variable, which depends on one variable, is infinitely close to the number a during the change of the first variable, then the number a is called the limit of the quantity of the second variable. Here the concept of limit depends on the idea of the process of change and infinite approximation. The exact mathematical definition of the limit was formed in the 19th century. As a result, a new method appeared in mathematics - the method of limits. The application and development of this method led to the creation of differential calculus and integral calculus, the emergence of mathematical analysis.*

In limit theory, the properties of limits are examined, the conditions for the existence of a variable limit are studied, and rules are found that allow the calculation of limits of complex functions by knowing the limits of a few simple variables. One of the basic concepts of L.'s theory is infinitely small - a variable with a limit of zero. I. Newton, J. D' Alamber, L. Euler, O. Cauchy, K. Weierstrass, and Bolsano contributed greatly to the development of limit theory.

There are certain uncertainties in calculating the limit, 1) 0/0 2) infinite / infinite 3) infinite + infinite 4) infinite - infinite. The Lopital Lopital rule can be used for similar specific meshes. According to him, if this uncertainty is encountered in the calculation, it is possible to obtain a series of derivatives until the uncertainty disappears.

The values of x are less than 2, and as they approach 2, f (x) = x 2

Let's look at the table of values of the function:

X	**1**	**1,9**	**1,99**	**1,999**	**1,9999**
f(x)	1	3,61	3,9601	≈ 3,996 00	≈ 3,999 60

As can be seen from the table, the closer the values of x are to 2, the closer the corresponding values of the function f (x) are to 4.
In this case, when x argument (variable) approaches 2 from the left, we say that the values of f (x) approach 4.

Now let's look at the table of values of the function f (x) = x 2 when the values of x are greater than 2 and approach 2.

X	3	2.1	2.01	2.001	2.0001
f(x)	9	4.41	4.0401	≈ 4,004 00	≈ 4,000 40

In this case, when the argument x approaches 2 from the right, the values of the function f (x) approach the number 4.

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Summarizing the above two cases, we say that when the argument x approaches 2, the values of f (x) approach the number 4, and we write this as follows:

limx → 2 x2 = 4

This notation reads as follows: When the argument x approaches 2, the limit of the function f (x) = x 2 is 4.

In general, the concept of function limit is approached as follows:

If x ≠ a and its values are close to a, then the corresponding values of f (x) are close to A. In this case, when the number A approaches x a, the limit of the function f (x) is called and is defined as.

limx → a f (x) = A In some cases we say that the function f (x) tends to A when the values of x tend to a.

Theorems on limits

The basic theorems about the limit of a function (about addition, multiplication, division) also make it easier to calculate the limit of a function, similar to the theorems of sequence limits.

Theorem 1. The limit of the sum (difference) of functions is equal to the sum (difference) of the limits of these functions.

Theorem 2. The limit of multiplication of functions is equal to the product of limits of these functions.

The result. The constant multiplier can be placed in front of the limit sign

Theorem 3. The limit of the division of functions is equal to the division of the limits of these functions, when the limit of the divisible function is different from zero:

Excellent limits. The limit of the ratio of the arc sine to this arc: This equation is called the first ideal limit.

Theorem 1.has a variable limit of 2 to 3.

Definition. The limit of a variable is called the number e.

E number irrational number: e = 2, 7182818284...

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