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# ELEMENTS OF MATHEMATICAL LOGIC AND THEIR PROBLEMS

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## Abstract

These considerations serve as the main objects of investigation in the section called algebra of mathematical logic. It is interesting to look at the meaning of each statement of mathematical logic, whether it is true, true, true or false.
Thus, in mathematical logic, it is said: "Every statement has the property of being either true or false."

**Keywords.** False, mathematical logic, algebra, understand, true, statement, called algebra.

## Introduction

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In the algebra of propositions, one usually deals not only with concrete propositions, but also with any propositions of any kind. This leads to the concept of a proposition with a variable. If a proposition with a variable $x$ If we define as, then $x$ It represents any of the concrete considerations. That is why it is because: “**ch**” and “**yo**” represents a variable with a value.

Mathematical logic is called the logical operations between the statements (connectors) of the words "not", "or", "and", "if ..., then ...", "so and only so ..., when ....". With the help of these operations, complex statements are built from elementary statements. Statements are studied in the so-called algebra of statements, or the logic of statements, which is an elementary part of mathematical logic.

Both terms refer to a certain part of logic from two points of view: it is used synonymously as both logic (according to its subject) ("logic of reasoning" and "algebra of reasoning"), and algebra (according to its method).

In mathematics, logic is a branch of mathematics that studies "statements" and logical operations on them. Any statement that can be used to reason about true and false information is called a statement.

m The elements of a set can be seen in many literatures as being written in the Latin alphabet in printed form and designated by capital letters with or without an index. That is, A, B, C, A t, A 2..., A n — are considerations.

A If the statement is true, we assign it 1, if it is false, we assign it 0, that is, we introduce the following representation in the set: We understand a statement that can be determined as true or false with a single value as a statement. Statements such as “Negroes are white people”, “5 > 2”, “Today is May 5” are statements that belong to statements. However, not all statements are statements, for example, we can say that statements such as "Long live the youth of Uzbekistan!" are not statements, but they are not included in the category of statements. So, for each statement to be a statement, they must be statements and we must determine whether it is true or false with a single value. We can define it through the set of all statements in languages such as Uzbek, Kyrgyz, Tajik.

(1, if A rost if A4 (A) ~ jo, if A if it's a lie. ц (A) is called the logical value of the statement A. In order to simplify the notation when we fill in the truth tables, fx (A) instead of A implies writing.

A and B The conjunction of the ideas is - A and B A statement that is true only when it is true and false in all other situations. A and B It is said to be a reflection.

The work on the arguments is written using a special method. These methods are used in all branches of modern mathematics.

1. These symbols are as follows:
2. ⟹-if… if so, then...
3. P⟹Q-if If P, then Q (Q follows from P);
4. ⟺- of equal strength P⟺Q-P and Q equal strength (P From Q comes P, from Q comes P
5. ∨- disjunction (or action);
6. ∧- conjunction (and action);
7. ∀- optional, all, any
8. ;∃- yes, there is
9. ∄- not available

Desired $x$ with variable reasoning $\bar{x}$ let us consider a second variable defined in the form $x$ considered a denial of opinion $\bar{x}$ The argument is characterized by the fact that when x accepts the value "ch" for the argument, it accepts the value "yo" for the argument, and vice versa.

So, the simplest operation of the logic of arguments is the operation of negation, which corresponds to the negative adjective "not" in ordinary language. Therefore, if $x$ If there is true reflection, then $\bar{x}$ will be a false statement, and vice versa, $x$ if it's a lie $\bar{x}$ it's true.

We illustrate the effect of the negation operation in the form of the following truth table:

| $x$ | $\bar{x}$ |
|---|---|
| ch | yo |
| yo | ch |

We take the same table as the definition of the negation operation, and we use similar tables for other logical operations. They are called truth tables. These tables are convenient to use, and they are used in many branches of mathematical logic.

$x$ and $y$ We will show and define the action of conjunction (from the Latin conjunctio - I connect) performed on variable statements.

We call logical operations that correspond to the conjunction "and" a conjunction.

$x$ and $y$ conjunction of thoughts $x$ and $y$ It takes on true values only when the statements are true, and false values otherwise.

$x \wedge y$ The statement in the form is read as « and ». It is clear that this definition fully corresponds to the meaning of the conjunction «and». Indeed, the statement «5 is odd and prime» is true, because both the statements «5 is odd» and «5 is prime» that constitute it are true. The statement «10 is divisible by 5 and 7>9» is false, because one of the statements that constitute the complex statement, namely «7>9», is false. The definition of a conjunction can be written in the form of the following truth table:

| $x$ | $y$ | $x \wedge y$ |
|---|---|---|
| sh | sh | sh |
| ch | yo | yo |
| qo | ch | yo |
| yo | yo | yo |

“ $x \to y$” reflection "if" $x$, in that case $y$” the definition of implication can be written in the form of the following truth table:

| $x$ | $y$ | $x \to y$ |
|---|---|---|
| sh | sh | Sh |
| ch | yo | yo |
| yo | ch | ch |
| yo | yo | ch |

From the truth table, it can be seen that the second of the above statements is false, and the rest are true. “ $x \to y$”implication $x$ the reasoning is called the basis, and that reasoning is called the consequence of that basis.

The last two lines of the truth table of implication show that both a true conclusion and a false conclusion can be derived from a false premise, in other words, "something can be expected from a false premise."

Implication is one of the important operations of deductive logic. In colloquial language, "if $x$, u holda $y$” has various synonyms:“ $x$ etc.

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