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Logical Operations (Implication, Conjunction, Disjunction, Equivalence)

Yuldoshev Mansur Najmiddin ugli
Academic Lyceum of Tashkent State University of Economics lead math science teacher,
mansuryuldoshev212901@mail.ru

Abstract

In this article, logical operations, in particular implication, conjunction, disjunction, equivalences, are described in detail and relevant examples are presented.

Keywords: implication, conjunction, disjunction, equivalence, theorem, etc.

Sentences are the main object of investigation in the reasoning algebra section of mathematical logic. In mathematical logic, depending on the meaning of each statement, it is important that it is true, correct, truthful or false, incorrect. For example, Tashkent is the capital of Uzbekistan, Samarkand is an ancient and modern city; Statements such as the 2750th anniversary of the city of Samarkand will be widely celebrated are true or correct statements (comments). The earth is smaller than the moon. 3 > 5, 7 > 9, 12 > 15 are false and incorrect statements (judgments). Sometimes it is difficult to quickly determine whether many words, texts or works are true or false. For example, the statement "Today's night is darker than yesterday" is either true or false depending on when and where it is said. On this basis, the following rule exists in the science of mathematical logic: A statement that can only take a true or false value is called a proposition. Come to me; Have you been home? Happy holidays! When will you come? Why don't you prepare a lesson? Go well! Sentences such as Each opinion has a real value in a certain situation. After that, we briefly denote the true value by the symbol χ (1), and the false value by the symbol yo (0). Small letters of the Latin alphabet are used to denote comments; a, b, c, x, y, z... There are also considerations that accept true or false values in all possible cases. Such judgments are called true (absolute) and (false) judgments. For example, it is always hot in summer. Uzbekistan is like a great country with a future.

In the algebra of judgments, not only concrete judgments are studied, but also any desired judgments. Such considerations are called variable considerations. For example, when a girl with long hair is cut, she becomes short. That's why we denote variable reasoning by x. Then x serves to represent any concrete consideration. Therefore, x represents variables with two different values: true and false: x1=1(ch) x2=0(yo). In mathematical logic, words such as or, and if, then, then and only then, when, etc. (connectors) are called logical operations between arguments. With the help of these operations, complex considerations are made from elementary considerations. The laws related to the term logic of such complex reasoning are studied in the algebra of reasoning. The terms Deductive Algebra and Deductive Logic are synonymous with each other. Because both of them express opinions from two points of view. There are 5 logical operations and they include: The act of denial. With any variable x, the x proposition is characterized by the fact that when the x proposition, which is called the negation of the x proposition, takes the true value, the x proposition takes the false value and vice versa. This simplest operation of reasoning logic is called the operation of negation, and it can be expressed in ordinary language with an adjective. A disjunction or logical sum operation. The 3rd operation used in reasoning logic corresponds to the conjunctions or, or, and is denoted XÚY (x or y). Description. The logic operation either // or // or used in a non-negative sense is called a disjunction. The word

disjunction comes from Latin and means "to make a difference", "to make a difference". The disjunction of two propositions x and y is written as x Ú y and read as x or y. The act of implication. The implication of statements x and y is the statement that is true only when x is true and y is false. The word implication comes from Latin and means "to bind tightly". This action is denoted by the symbol ® and the statement x®y is read as y if it is x.

Equivalence (equivalence) operation (equal strength operation). This operation is represented by the symbol « and the complex statement x«y is read as "x is equivalent to y". A complex statement x«y is true if both x and y are true, or both x and y are false, otherwise this statement is false. These are built around conjunctions such as "necessary and sufficient", "only and only", "only and only then", "when", "it is sufficient and necessary to fulfill". Conjunction and disjunction are phenomena in a dialectical relationship with each other. They are considered simple, logical operations that form mutually complex expressions and judgments, and stand alongside implication, equivalence, etc. Conjunction refers to the relationship of two or more things and events connected simultaneously in a common space. In the Uzbek language, it is expressed among the syntactic devices formed by the conjunctions and, and, and and expresses syntagmatic relations of language units based on a linear direction. Disjunction refers to mutually alternative events that occur in the form of confirmation and denial in the nature of contradiction. In the Uzbek language, a paradigmatic relation based on the combination of "or", "or" and "or" is realized. The phenomena of conjunction and disjunction can be explained at the phonetic, lexical, morphological, and syntactic levels of any language. For example, if the alternatives of the concept of phoneme in the vowel and consonant structure are related to the action of disjunction (a and b, g and u), vowels (i and e, u and o, o' and a), consonants (v, г, д, ж, з, к,...) is considered a linguistic expression of the conjunction action. The actions of conjunction and disjunction are also very actively involved in the meaning structure of lexical level units. This can be proved by the example of each LSG (lexical-semantic group) included in the lexical level. For example, in Turkish languages, including in Uzbek, the expressions of family-relationship are child, father, mother, uncle, younger brother, brother, sister, sister, uncle, aunt, uncle, cousin, son. , daughter, granddaughter, aunt, grandfather, grandmother, etc., form one common LSG. Mutual disjunction and conjunction relations are expressed between these semantic units. For example, the word "child" is a term in the nature of a hyperonym, and its semantic structure contains two semantic units in a disjunctive relationship. R=xÚy (child = girl or boy). These semantic units are mutually disjunctive. In families with many children, children are again divided into internal semantic disjunctive units: Big boy or little boy. This relationship is used to express the hyperonym grandchild // grandchild in syntactic units: Son's child or daughter's child = grandchild; The child of the eldest son or the child of the youngest son = grandson; Elder daughter's child or younger daughter's child = grandchild; A child of an older son or a child of a younger daughter = grandchild. Among the formulas, the equivalent formula and the non-equivalent formula differ from each other. If the formulas A and V are given, then for each value line of the elementary considerations, the equivalent formulas of the formulas A and V are called. Non-equivalent formulas are called if the corresponding values of formulas A and V for at least one row of values are not the same. (Denoted as A¹V). The concept of normal forms of formulas has a special place in logic algebra.

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