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CLASSIFICATION OF SOME LOGICAL TASKS AND THEIR SOLUTION BY TABLES OF TRUTHFULNESS

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Solving logical problems is a common way to train and develop the mental abilities of learners. There are no standard algorithms for solving logical problems, and attempts to find them continue. At the same time, there are differentiated, certain lessons on these problems, where they are solved by a certain principle. The most common ways of solving the logical tasks are the usage of the tables of correctness and the logical algebraic modes.

Key words: *logical problems, logical algebra, truthfulness chart, statement, resolution.*

Introduction

In mathematics logical problems form a unique lesson, the algorithms of the solutions are generally very unique and have been constantly tested to classify those issues and solve them according to a particular class.

To solve a classic logical problem, it is important to know the basic ways and approaches to its solution. To solve the same problem and to get the right answer, in many cases, it is possible to achieve it in different ways. Knowledge of different ways of solving problems will help to find out what method is more efficient and faster to solve the problem.

Textual tasks refer to "classical" logical tasks, the purpose of which depends on the conditions of the problem, the recognition or arrangement of certain objects in a particular order. The more complicated and attractive are the issues in which separate claims are true and the rest are untrue. Examples of non-standard wide-range logical problems include relocation, installation, weighing, and recovery issues.

The following methods of solving logical problems have been most common:

- the way of judgment;
- the way of using tables of truthfulness;
- logical algebra method.

The logical algebra is a powerful means of solving logical problems.

Statement of the question

The article presents a set of solving methods of some logical problems of certain class by using the tables of truthfulness. The essence of the method lies in the fact that the conditions of the problem are tailored to the corresponding tables of the problem and getting the results through judgments. Depending on whether true or not is the statement in the table, the corresponding box is filled in "1" or "0".

Example 1.

Three sportsmen A,B and C are playing basketball. When the ball appears in the basket, A cries: "B has thrown the ball into the basket".

B objects: "C has thrown the ball", and C insists: "I have not done it".

Who has thrown the ball into the basket if one of the three is lying?

Solution. We make a chart on the following principle: to the left we write all the claims that we have in the condition, above we write all the possible options of the facts.

Let's regard the first possible option which says that A has thrown the ball into the basket. We discuss the statement from the left and fill in the first column.

According to our suggestion (A has thrown the ball into the basket) the claim of "B has thrown the ball into the basket" is not true. We insert 0 into the box. The claim of "C has thrown the ball into the basket" is not true too, so we insert 0 into that box. The claim of C is right, i.e. " I haven't thrown ball into the basket", consequently, we insert "1" into the box.

Let's regard the second possible option which is "C has thrown the ball into the basket" and fill in the second box.

The statement that "B has thrown the ball into the basket" is not true, so we insert 0 in the appropriate box.

The statement that "C has thrown the ball into the basket" is true, that's why we insert 1 into the box. The statement of C that "I haven't thrown the ball into the basket" is not true. We insert "0" into the box.

And at last, the third possible option is "B has thrown the ball" . In this case the statement that B has thrown the ball into the basket" is right, so we insert "1" into the box.

The statement that "C has thrown the ball into the basket" is not true, so we insert "0" into the box. Ant the statement "I haven't thrown the ball into the box" is true, consequently, we insert "1" into the box.

Table 1

Statements	Possible options of facts		
	A has thrown the ball into the basket	C has thrown the ball into the basket	B has thrown the ball into the basket
A: B has thrown ball into the basket	0	0	1
B: C has thrown ball into the basket	0	1	0
C: I haven't thrown ball into the basket	1	0	1

As, according to the condition, only one sportsman has lied, we choose that possible option of the answer from the filled table where the wrong statement is one. That is the third column, where we get the answer of the task which is "B has thrown the ball into the basket" option (from the three one has lied).

Example 2.

Three musicians Babken, Suren and Vrezh have got job in the symphonic orchestra , who are able to play violin, cello, viola, clarinet, hobo and trumpet.

It is known that

1. Suren is the tallest of all;
2. player of the violin is shorter than the player of the cello;
3. the players of the violin and cello and Babken like to eat pizza;
4. when the players of alt and trumpet argue, Suren tries to reconcile them;
5. Babken can not play the trumpet and hobo.

What instruments can play these musicians if each of them can play two musical instrument.

Table 2

Instruments / Musicians	violin	cello	alt	clarinet	hobo	trumpet
Babken	0	0	1	1	0	0
Suren	0	1	0	0	1	0
Vrezh	1	0	0	0	0	1

Solution. Build a table containing the terms of the problem, filling in the corresponding boxes by 0 or 1, depending on whether it is true or not.

As musicians are all three and the instruments 6 and each musician can play on both instruments, so every musician plays on the instruments on which others can not play. It follows from the 4th that Suren does not play on the hobo and clarinet, and in terms of conditions 3 and 5 it follows that Babken plays on the viola and clarinet. The first line is complemented with no difficulty. It follows from conditions 1,2,4 that Suren does not play violin and trumpet, where follows that Vrezh plays violin and trumpet. The rest is very clear, Vrezh can not play on the hobo and cello, and it remains that Suren is able to play on those instruments.

Example 3.

In response to the question of which of the three students studied mathematical logic, the following answers were received:

"If the subject was examined by the 1st student, and it was also examined by the 2nd student", but the statement of "if the subject was examined by a third student then the second student also examined it" is not true.

Who has studied the subject of mathematical logic?

Solution. Make appointments with P1, P2, P3 assuming I, II, III. Students have studied the subject of mathematical logic respectively.

From the conditions of the problem we get (P1 → P2) & (P3 → P2). The truth of the statement is in the chart.

Table 3

$P1$	$P2$	$P3$	$(P1 \to P2)$	$(P3 \to P2)$	$(P1 \to P2)\&(P3 \to P2)$
0	0	0	1	0	0
0	0	1	1	1	1
0	1	0	1	0	0
0	1	1	1	0	0
1	0	0	0	0	0
1	0	1	0	1	0
1	1	0	1	0	0
1	1	1	1	0	0

We conclude from the table that the third student has studied mathematical logic.

Results of the study

By presenting the logical problem with the claims, presenting the problem in the form of the final claim and using the rules of filing the table of truthfulness of logical algebra, we get the solution of the tasks.

Conclusion

With a logical algebra, the logical problem solving algorithm can be presented as follows:

1. it is necessary to study carefully the conditions of the problem;
2. separate simple words and designate them in Latin lowercase;
3. write the terms of the problem in the language of logical algebra;
4. to make the final formula for which you need to combine all the formulas and equate to one by logical multiplication and summarizing;
5. simplify the formula by examining the received result or making a verification table. Find the values in the table for which the final statement is true, F = 1.

Taking advantage of the logical algebra with the rules of action and the terms of the problem, getting the final statement of the problem, we get the answer to the problem by completing the table of truthfulness.

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ՏՐԱՄԱԲԱՆԱԿԱՆ ՄԻ ՔԱՆԻ ԽՆԴԻՐՆԵՐԻ ԴԱՍԱԿԱՐԳՈՒՄՆ ՈՒ ԼՈՒԾՈՒՄԸ ՃՇՄԱՐՏԱՑԻՈՒԹՅԱՆ ԱՂՅՈՒՍԱԿՆԵՐԻ ՄԻՋՈՑՈՎ

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Շուշիի տեխնոլոգիական համալսարան

Տրամաբանական խնդիրների լուծումը ընդունված միջոց է մարզելու և զարգացնելու սովորողների մտավոր կարողությունները: Տրամաբանական խնդիրները լուծելու համար գոյություն չունեն ստանդարտ ալգորիթմներ և դրանց գտնելու փորձերը շարունակվում են: Միևնույն ժամանակ արդեն տարբերակվել են, առկա են այդ խնդիրների որոշակի դասեր, որտեղ խնդիրների լուծումները կատարվում են որոշակի սկզբունքով: Առավել տարածում են ստացել տրամաբանական խնդիրների լուծումների դատողությունների, ճշմարտացիության աղյուսակների օգտագործման և տրամաբանական հանրահաշվի եղանակները:

Բանալի բառեր. տրամաբանական խնդիրներ, տրամաբանական հանրահաշիվ, ճշմարտացիության աղյուսակ, ասույթ, բանաձև

КЛАССИФИКАЦИЯ НЕСКОЛЬКО ЛОГИЧЕСКИХ ЗАДАЧ И ИХ РЕШЕНИЯ С ПОМОЩЬЮ ТАБЛИЦ ИСТИННОСТИ

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Решение логических задач - общепринятый метод обучения и развития логических способностей учащихся. Не существуют стандартные алгоритмы для решения логических задач, и их поиски продолжаются. В то же время наличествует дифференциация определенных классов, где задачи решаются по определенному принципу. Для решения логических задач наиболее распространенными являются методы: использование суждений, таблиц истинности и алгебры логики.

Ключевые слова: логические задачи, алгебра логики, таблица истинности, высказывание, формула.