

6-th Bulgarian National Olympiad in Informatics

April 20 and 23, 1990

Selection round

Theme 1.

Let us consider a computing system, that has many identical processors. All the processors use a common memory for saving numerical values of the variables A, B, ..., Z. The system works in a stepwise manner. At each step, every processor executes either an empty command or an assignment command. An assignment command has the following description:

`<variable> = <arithmetic expression>`

where the arithmetic expression does not contain brackets and consists of up to 2 variables and arithmetic operations. After computing the result, every processor assigns it to the left hand side variable and all the processors go over to the next commands. It is not allowed for two or more processors to execute simultaneously commands with the same variable at the left hand side.

Let us denote the empty command by &. Executing this command, the processor idles during the current step. An aggregate of n sequences, each containing l commands, is called n -program, if there is at least one assignment command at each step. An n -program is designed to be executed simultaneously by the first n processors for l steps. We say that n -program P is equivalent to n -program Q , if and only if both the programs starting with the same initial values of the variables A, B, ..., Z will produce the same final values for these variables.

Write a program for solving the following problems:

Problem 1.

Input a positive integer k , ($k < 25$) and an 1-program containing k assignment commands;

Problem 2.

Verify the correctness of the inputted commands;

Problem 3.

Transform the inputted 1-program to an equivalent of it n -program with the minimal length (possibly adding some appropriate empty commands) and display the obtained result;

Problem 4.

Without lengthening the obtained n -program from the previous problem, transform it to an equivalent m -program with the minimal value of m and display the result.

An example:

An input 1-program:

```
A=B+C  
A=A - E  
B=C+D  
D=D - E  
E=A * B  
D=A * D
```

A 3-program, that can be a possible solution for the problem 3.

```
A=B+C      B=C+D      D=D - E  
A=A - E      &          &  
E=A * B      D=A * D      &
```

A 2-program, that can be a possible solution for the problem 4.

```
A=B+C      B=C+D  
A=A - E      D=D - E  
E=A * B      D=A * D
```

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