



**ИНФОРМАТИКА**

**COMPUTER  
PROGRAMMING**

### Problem 1. *Rectangles*

N rectangles are given on a plane. Find a point on a plane, which belongs to the greatest number of rectangles. The sides of rectangles are parallel to the axis of coordinates.

The point belongs to the rectangle if it belongs to its border or located inside of it.

#### Input data

The first line of input file RECIN.TXT contains the number N ( $1 \leq N \leq 100$ ). The following N lines contain two pair of real numbers respectively; these numbers assign coordinates of left lower and right upper tops.

#### Output data

In output file RECOUT.TXT extract two material numbers – coordinates of a searchable point.

#### Example

RECIN.TXT	RECOUT.TXT
4	1 4.5
-2 3 1 6	
2 2 5 4	
1 3 3 5	
0 4.5 2 8	

### Problem 2. *Division*

Calculate the quotient and remainder from division of number  $a^n$  by a number  $b^m$ .

#### Technical requirements

a, n, b, m - integers, not exceeding MaxInt.

#### Input data

The first line of the Input file DIVIN.TXT contains meanings of a, n, b, m separated by a space.



**Output data**

The first line or lines of the Output file DIVOUT.TXT contains the quotient. Then goes the empty line. The remainder goes after empty line.

**Problem 3. *The Domino***

Checkered board with  $N \times M$  size is covered by one layer of dominos, each one of which has a form of a rectangle with size  $2 \times 1$ . Each domino simultaneously should be turned relatively to the center of one of its squares by 90 or 180 degrees so that the whole board remains completely covered as it was.

According to location of a domino on the board calculate a possibility of this action, and extract the location of a domino on the board after required turnings.

**Input data**

In the first line of input file INPUT.TXT go two numbers separated with a space:  $N$  - amount horizontals and  $M$  - amount of verticals on the board. In the following  $N$  lines go  $M$  numbers separated with a space, indicating location of dominos in each of horizontals on the board. Herewith, two equal numbers located in near-by cells (either by horizontal, or vertical line) correspond to each domino (equal to number of this domino. The dominos are numbered by the natural numbers from 1 to  $S$ , where  $S$  is their amount on the board.

**Output data**

Output data is given in file OUTPUT.TXT and has  $N$  lines with  $M$  numbers in each line, indicating location of dominos after turnings.

**The Example of input file INPUT.TXT**

```
2 4
1 1 2 3
4 4 2 3
```

**Corresponding output file OUTPUT.TXT**

```
1 4 3 3
1 4 2 2
```

**Problem 4. *Guess the number***

Your program must guess the natural number, conceived by jury. The only information that is known about this number beforehand is that it does not exceed given  $N$  ( $N \leq 1000$ ). In order to guess you ask questions, which



indicate certain interval of numbers, and if a number you're guessing belongs to this interval (the borders of interval belong to interval) jury answers "Y", if it doesn't - "N". After several such questions a program must report guessing number. A trick of the jury is concluded in the fact that it can give the wrong answer to one of the questions (unknown which one).

The amount of asked questions must be as less as possible.

#### Input data

Data entry via the keyboard only.

#### Output data

The questions and result are shown on the screen.

#### Example of program functioning

Program	Jury
N=	10
1 5	N
6 10	N
1 5	Y
1 3	N
4 4	Y
4	

#### Problem 5. *The Championship*

It's the ski championship. The track route of competitions lies inside the triangle, a top of which is the start place, and an opposite side is the finish line. Track route presents itself as a broken line inside of triangle from start to finish (beginning of a broken line is a point of start, end of a broken line must get to the line of finish). A skier passes each segment of a broken line per a unit of time. Lengths of the two near-by segments either coincide, or differ by a unit of track (a unit of track equals 1 meter). The length of the first segment equals zero.

Find the minimum time of route passing and indicate the coordinates of possible point on the finish line with minimum time. If there are no such points print "N".

#### Input data

The first line of input file INPUT.TXT contains the coordinates of start point, two following lines contain coordinates of border points of finish line.



## Output data

The first line of output file OUTPUT.TXT contains a meaning of minimum time of route passing; the second line contains coordinates of finish point or "N".

## Problem 6. Olympic daydream

One of the Olympic sports is a competition, which combines running, jumping and throwing.

Specialists using individual index by L-points scale from 1 to L evaluate the level of preparation of the athletes on each type of competition. Only athletes having maximum index level of preparation at all three types of competition have a chance to get in assembly command of a country. The leading light athletics specialists of a country designed different training cycles of exercises for special preparation of athletes for this competition. For each cycle of exercises there are determined minimum indexes of level of preparation of athletes to each type of competition necessary for an athlete to execute a cycle. Also there are determined indexes that will be reached by an athlete after finishing this cycle. If an athlete has already had a higher index at any other type of competition, then this level wouldn't decrease. In order to finish a training cycle on a certain exercise that raises at least one index, it takes two months for an athlete, otherwise - one month.

Beginner athlete Victor (the index of level of preparation at all types equals 1) dreams of participating in the next Olympic games. It's required to design a training plan, that will allow him to reach preparation level L at each of three types of competition spending not more than T months and finishing as many different cycles of exercises as possible.

## Technical requirements

Time restriction - 10 seconds for test

## Input data

The first line of input file OLIMPIN.TXT contains number T - amount of months left till the coming Olympic games. The second line contains number L ( $2 \leq L \leq 16$ ), and the third line - amount of different cycles of exercises M ( $1 \leq M \leq 500$ ,  $T \leq 2M$ ). Each of the following M lines contains 6 numbers, describing one of the determined cycles of exercises. First three numbers define the indexes of level of preparation of the athlete at all three types of competition for the athlete to execute this cycle. The following three numbers assign the indexes that may be reached as a result of execution of this cycle by increasing those levels of preparations, which were lower.



### Output data

At a possibility of achieving the level of preparation L at all three types of competition in output file OLIMPOUT.TXT at first extract maximum amount of cycles of exercises in training plan, and then - sequence of numbers of cycles that Victor must finish (extract one of the possible solutions if there are several of them). Cycles of exercises are numbered in order that is given in the input file, not a single certain cycle of exercises can not be specified more than once. If by means of specified set of cycles of exercises in input file Victor is not able to reach L level at all three types of competition for the time period that equals T, extract a number 0 in the output file.

Will Victor's daydream come true?

Example of input file

```
7
5
6
2 1 1 2 4 5
1 1 1 3 1 1
3 3 3 3 3 3
1 3 1 5 5 5
2 2 2 2 2 2
1 2 3 2 3 4
```

Example of output file

```
4
2 1 4 3
```