Problem F
Switch Network

Input File: F.DAT
Program Source File: F.PAS or F.C or F.CPP

Professor MAG invented a switch and proposed it as a basic element in microprocessor construction. By connecting switches and sending signals on specified input and control pins he can obtain network that can solve any specified logical or arithmetic operation. But to know whether this switch network implements given operation, Professor MAG must know the signal values on switch outputs. Help him to find signal values on switch outputs!

The switch, depicted on figure 1, has 5 pins: L and D – input pins, R and U – output pins, S – control pin. Switch can be in two states:
1. if $S = 0$ then L is connected to R and D is connected to U (figure 2);
2. if $S = 1$ then L is connected to U and D is connected to R (figure 3).
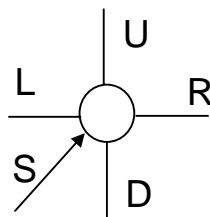

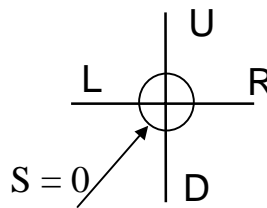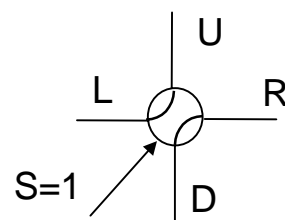Figure 1   Figure 2   Figure 3

We will say that two switches are connected if some output of the first switch is connected to an input of the second switch. The switch network is a connection of switch elements.

The switch network, the signals on some inputs and the signals on all control pins are given. You must find signals on specified output pins using given information.

Input

Here the structure of the input file is described.

The first line of the input file contains the number of tasks to solve. The next line begins with the first task data. The task's data are separated by a blank line.

The task data has the following structure:

The first line of the task data contains number of switches N, where N<=4000 and number of network connections K.

The switches are numbered from 0 to N-1. Switch inputs have labels L and D, switch outputs have labels R and U.

Next K lines describe connections among switches. Each line has the form: SW1 OUT SW2 IN, separated with one blank. SW1 and SW2 are switch numbers, OUT is an output of switch SW1, IN is an input of switch SW2. The output OUT of switch SW1 is connected to input IN of the switch SW2. The number SW2 is greater than the number of SW1. Each output of switch can be connected to only one input. Each input can be connected to only one output.

Then there is a blank line as well.

Next line contains N signal values on control pins of switches 0..N-1. The possible signal values are 0 or 1. Then there is a blank line.

We can send a signal 1 to any input, which is not connected to output. Next line has a number SG of signals with value 1 sent to inputs. Then follows SG signal lines. Each signal line

contains switch number SW and input IN, separated with one blank. It means that the signal with value 1 is sent to the input IN of the switch SW. If the input of a switch is not connected to any output and signal with value 1 is not sent to this input, we shall assume that this pin is idle (or the signal on this input equals 0).

Then follows blank line.

This was the description of the network structure. Now we want to know the signals on specified output pins. Next line contains number of tests TN to the current task. Next TN test lines has form: switch number SW and output OUT, separated with one blank. For each test line we must find signal on the output OUT of the switch SW.

With this we have finished the task data description.

Output

The output consists of NPR lines, where NPR is a number of tasks to solve. Each line contains TN signals. The i-th number in current output line is a signal on output OUT of the switch SW for the i-th test of current problem data

Sample data

Two tasks are presented on the following two figures. The corresponding input and output are printed below.
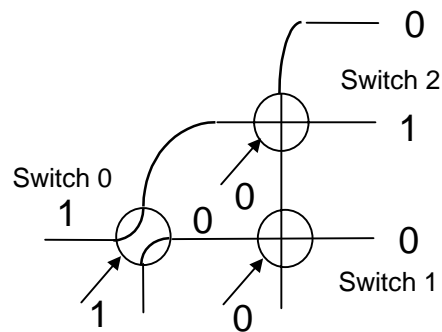
Switch network for the task data 1
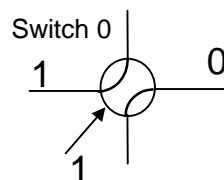
Switch network for the task data 2

Sample Input

```
2
3 3
0 R 1 L
0 U 2 L
1 U 2 D

1 0 0

1
0 L

4
0 R
2 R
2 U
1 R

1 0

1

1
0 L

2
0 R
0 U
```

Sample Output

```
0 1 0 0
0 1
```