

Problem JEDIRECRUITING: Jedi Recruiting

The Jedi are always searching for gifted children, who feel the force. But before the children are taught they face various challenges, to test their abilities. One of those tests requires a marble board.

The marble board is a simple wooden plank, which is positioned in an inclined manner. There are various grooves in the plank where marbles can be placed. The grooves form many intersections and therefore the marbles can take different routes. The task for the Jedi applicant is then to predict the route of the marbles.

To increase the difficulty for that test the supervisors decide to create new marble boards.

They specify quite strict instructions to create specific marble boards. On top there should be a single groove - the start of the marbles. There will be splitting and joining intersections.

A splitting intersection has one input groove and two output grooves. The marbles may run into this intersection only through the input groove. The marbles will then leave the intersection either through the left output groove or through the right output groove.

A joining intersection has two input grooves and one output groove. The marbles may run into this intersection either through the left input groove or through the right input groove. The marbles will then leave the intersection through the single output groove.

All grooves will either end as an input for an intersection or they end on the bottom of the board. Intersections are

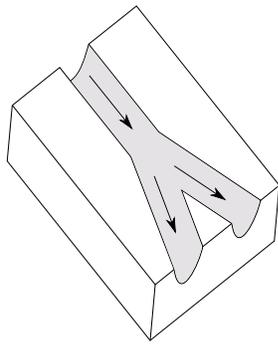


Figure 1: Splitting intersection

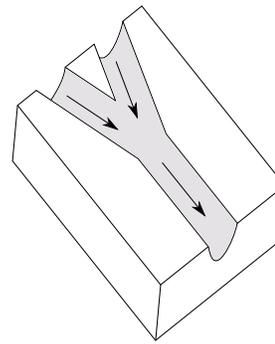


Figure 2: Joining intersection

specified in order from top to bottom. No two intersections will be at the same height. Marbles only run downwards. Please help the supervisors and verify the validity of their specification by checking whether the grooves can be placed without crossings.

Input

The first input line contains the two integers G the number of grooves and I the number of intersections ($1 \leq G, I \leq 200$). The index of the starting groove is 0. Each of the next I lines specify an intersection in order from top to bottom. The specification of an intersection consists of a character followed by three integers. If the character is an 'S' then a splitting intersection is specified and the three integers are i the index of the input groove, o_1 the index of the left output groove and o_2 the index of the right output groove ($0 \leq i, o_1, o_2 < G$). If the character is a 'J' then a joining intersection is specified and the three integers are i_1 the index of the left input groove, i_2 the index of the right input groove and o the index of the output groove ($0 \leq i_1, i_2, o < G$). Each index of a groove will appear at most once as input and once as output and it will appear as output not before it will appear as input. The only exception is the starting groove with index 0, which will appear only as the input of the first intersection.

Output

Print `valid` if there is a valid placement for the given specification and print `invalid` otherwise.

Sample Input 1

```
9 5
S 0 8 2
S 8 3 4
S 4 5 6
J 3 5 7
J 6 2 1
```

Sample Output 1

```
valid
```

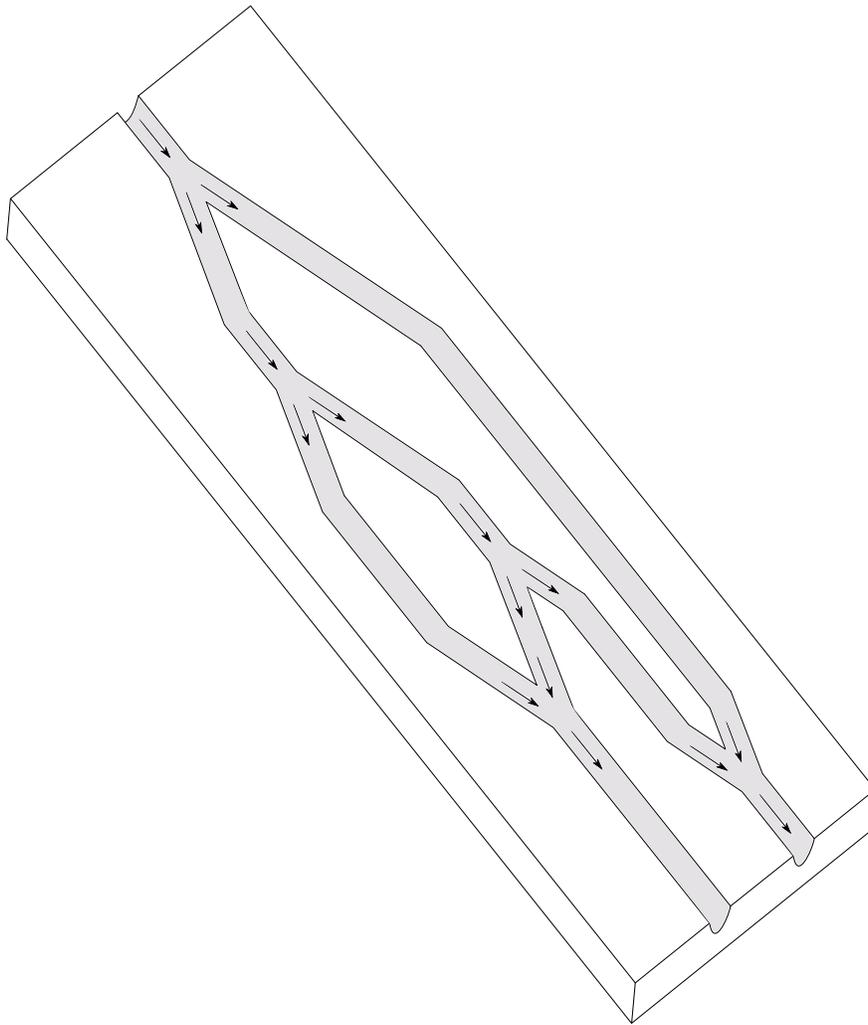


Figure 3: Visualization of a valid placement for the given specification in the first sample input

Sample Input 2

4 2
S 0 1 2
J 2 1 3

Sample Output 2

invalid