
Brackets

task: <code>brackets</code>	input file: <code>stdin</code>	output file: <code>stdout</code>
points: 100	time limit: 200 ms	memory limit: 1 GB

Task

A bracket symbol is one of the following: `()[]{}<>`. A correct *bracket expression* is any string consisting of bracket symbols, such that:

- Every left bracket has a matching right bracket of the same kind, and every right bracket is matched;
- No two pairs of matching brackets cross – for every two such pairs, they are either disjoint or one is contained inside the other.

For example, `([])<>` is a correct bracket expression, whereas `<{>` is not, as the curly brackets and angle brackets cross each other.

You are given a graph of n vertices in which every (directed) edge is labeled with one of the bracket symbols. A path in this graph is *valid*, if its edges form a correct bracket expression. For some two vertices s and t , determine the length of a shortest valid path between s and t . We allow the path to pass multiple times through any vertex.

Input

On the first line of input there are four integers n, m, s, t ($1 \leq n \leq 200$, $0 \leq m \leq 2000$, $1 \leq s, t \leq n$) – the number of vertices, edges, starting and ending vertex, respectively. Each of the following m lines contains two integers x, y and a bracket symbol b ($1 \leq x, y \leq n$), which describe one graph edge. Note that there may be loops and multiple edges.

Output

Output a single line containing a single integer – the length of the shortest valid path between s and t . If there is no such path, output -1 . You may assume that if a path exists, its length does not exceed 10^{18} .

Subtasks

Subtask	Points	Description
1	16	$n \leq 10, m \leq 50$
2	16	$n \leq 20, m \leq 100$
3	16	$n \leq 50$
4	16	$n \leq 100$
5	10	$s = 1, t = n, a < b$ for every edge (a, b)
6	26	no additional constraints

Samples

input	output
<pre>4 4 1 4 1 2 (2 2 [2 3] 3 4)</pre>	<pre>4</pre>
input	output
<pre>5 4 1 5 1 2 < 2 3 { 3 4 > 4 5 }</pre>	<pre>-1</pre>