Problem A. Badges

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

There are b boys and g girls participating in Olympiad of Metropolises. There will be a board games tournament in the evening and n participants have accepted the invitation. Organizers are preparing blue badges for boys and red badges for girls.

Vasya prepared $n+1$ decks of badges. The i-th deck contains $i-1$ blue badges and $n+1-i$ red ones.

Determine the number of decks among these $n+1$ that Vasya should take, so that there will be a suitable deck no matter how many girls and boys there will be among the participants of the tournament.

Input

The first line contains an integer b ($1 \leq b \leq 300$), the number of boys.

The second line contains an integer g ($1 \leq g \leq 300$), the number of girls.

The third line contains an integer n ($1 \leq n \leq b+g$), the number of the board games tournament participants.

Output

Output one integer, the number of badge decks that Vasya could take.

Examples

standard input	standard output
5 6 3	4
5 3 5	4

Note

In the first sample, each of the four possible decks should be taken: (0 blue, 3 red), (1 blue, 2 red), (2 blue, 1 red), (3 blue, 0 red).

In the second sample, four out of six possible decks should be taken: (2 blue, 3 red), (3 blue, 2 red), (4 blue, 1 red), (5 blue, 0 red). Decks (0 blue, 5 red) and (1 blue, 4 red) can not be used.

Scoring

This problem has 20 tests. Each test **including samples** costs 5 points and is scored independently.

Problem B. Bad Sequence

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

Petya's friends made him a birthday present — a bracket sequence. Petya was quite disappointed with his gift, because he dreamed of correct bracket sequence, yet he told his friends nothing about his dreams and decided to fix present himself.

To make everything right, Petya is going to move at most one bracket from its original place in the sequence to any other position. Reversing the bracket (e.g. turning «(» into «)» or vice versa) isn't allowed.

We remind that bracket sequence s is called correct if:

- s is empty;
- s is equal to «(t)», where t is correct bracket sequence;
- s is equal to t_1t_2, i.e. concatenation of t_1 and t_2, where t_1 and t_2 are correct bracket sequences.

For example, «`(()())`», «`()`» are correct, while «`)(`» and «`())`» are not. Help Petya to fix his birthday present and understand whether he can move one bracket so that the sequence becomes correct.

Input

First of line of input contains a single number n ($1 \le n \le 200\,000$) — length of the sequence which Petya received for his birthday.

Second line of the input contains bracket sequence of length n, containing symbols «`(`» and «`)`».

Output

Print «`Yes`» if Petya can make his sequence correct moving at most one bracket. Otherwise print «`No`».

Examples

standard input	standard output
`2` `)(`	`Yes`
`3` `(()`	`No`
`2` `()`	`Yes`

Note

In first example Petya can move first bracket to the end, thus turning the sequence into «`()`», which is correct bracket sequence.

In second example there is no way to move at most one bracket so that the sequence becomes correct.

In third example the sequence is already correct and there's no need to move brackets.

Scoring

Group	Points	Additional constraints	Req. groups
		n	
0	–	–	–
1	30	$n \le 100$	0
2	30	$n \le 1000$	0, 1
3	40	$n \le 200\,000$	0, 1, 2

Problem C. Treasure Island

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

All of us love treasures, right? That's why young Vasya is heading for a Tresure Island.

Treasure Island may be represented as a rectangular table $n \times m$ which is surrounded by the ocean. Let us number rows of the field with consecutive integers from 1 to n from top to bottom and columns with consecutive integers from 1 to m from left to right. Denote the cell in r-th row and c-th column as (r, c). Some of the island cells contain impassable forests, and some cells are free and passable. Treasure is hidden in cell (n, m).

Vasya got off the ship in cell $(1, 1)$. Now he wants to reach the treasure. He is hurrying up, so he can move only from cell to the cell in next row (downwards) or next column (rightwards), i.e. from cell (x, y) he can move only to cells $(x + 1, y)$ and $(x, y + 1)$. Of course Vasya can't move through cells with impassable forests.

Evil Witch is aware of Vasya's journey and she is going to prevent him from reaching the treasure. Before Vasya's first move she is able to grow using her evil magic impassable forests in previously free cells. Witch is able to grow a forest in any number of any free cells except cells $(1, 1)$ where Vasya got off his ship and (n, m) where the treasure is hidden.

Help Evil Witch by finding out the minimum number of cells she has to turn into impassable forests so that Vasya is no longer able to reach the treasure.

Input

First line of input contains two positive integers n, m ($3 \le n \cdot m \le 1\,000\,000$), sizes of the island.

Following n lines contains strings s_i of length m describing the isalnd, j-th character of string s_i equals "`#`" if cell (i, j) contains an impassable forest and "`.`" if the cell is free and passable. Let us remind you that Vasya gets of his ship at the cell $(1, 1)$, i.e. the first cell of the first row, and he wants to reach cell (n, m), i.e. the last cell of the last row.

Output

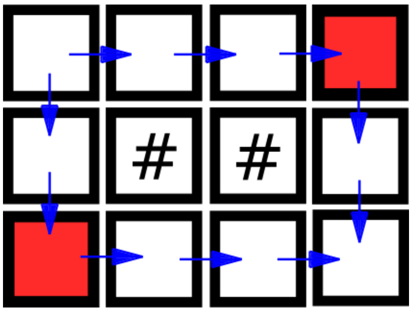
Print the only integer k, which is the minimum number of cells Evil Witch has to turn into impassable forest in order to prevent Vasya from reaching the treasure.

Examples

standard input	standard output
2 2	2
4 4 .... #.#. .... .#..	1
3 4 .... .##.	2

Note

The following picture illustrates the island in the third example. Blue arrows show possible paths Vasya may use to go from $(1, 1)$ to (n, m). Red illustrates one possible set of cells for the Witch to turn into impassable forest to make Vasya's trip from $(1, 1)$ to (n, m) impossible.



Scoring

Tests for this problem are divided into five groups. For each group you earn points only if your solution passes all tests in this group and all tests in all **required** groups except the sample tests.

Group	Points	Additional constraints	Required groups	Comments
		$n \cdot m$		
0	0	–	–	Sample tests
1	15	$n \cdot m \le 20$	–	–
2	20	$n \cdot m \le 500$	1	–
3	20	$n \cdot m \le 1\,000\,000$	–	$n = 2$
4	20	$n \cdot m \le 250\,000$	–	$k \le 1$
5	25	$n \cdot m \le 1\,000\,000$	1, 2, 3, 4	–

Problem D. Tiles Placement

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	512 megabytes

The new pedestrian zone in Moscow city center consists of n squares connected with each other by $n-1$ footpaths. We define a *simple path* as a sequence of squares such that no square appears in this sequence twice and any two adjacent squares in this sequence are directly connected with a footpath. The size of a simple path is the number of squares in it. The footpaths are designed in a such a way that there is exactly one simple path between any pair of different squares.

During preparations for Moscow City Day the city council decided to renew ground tiles on all n squares. There are k tile types of different colors, numbered from 1 to k. For each square exactly one tile type must be selected and then used to cover this square surface. To make walking through the city center more fascinating, it was decided to select tiles types for each square in such a way that any possible simple path of size exactly k contains squares with all k possible tile colors.

You need to find out whether it is possible to place the tiles this way or not.

Input

The first line contains three integers n, k and w ($2 \le k \le n \le 200\,000$, $w \in \{0, 1\}$) — the number of squares in the new pedestrian zone, the number of different tile colors, and flag, describing whether you need to present the distribution of colors among the squares or not.

Each of the following $n-1$ lines contains two integers v_i and u_i ($1 \le v_i, u_i \le n$) — numbers of the squares connected by the corresponding road.

It's guaranteed, that it's possible to go from any square to any other square, moreover there is exactly one such simple path.

Output

Print "`Yes`" if it is possible to assign tile colors this way and "`No`" otherwise.

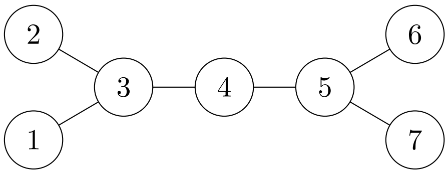
In case your answer is "`Yes`" and $w = 1$, print n integers from 1 to k each, the color of the tile for every square.

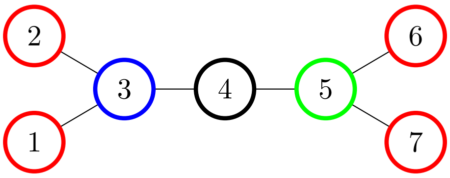
Examples

standard input	standard output
7 4 1 1 3 2 3 3 4 4 5 5 6 5 7	Yes 1 1 2 3 4 1 1
7 3 0 1 3 2 3 3 4 4 5 5 6 5 7	No

Note

The following pictures illustrate the pedestrian zone in first and second examples. The second picture also shows one possible distribution of colors among the squares for $k = 4$.





Scoring

Group	Points	Additional constraints		Req. groups
		n	w	
0	0	–	–	–
1	20	$n \le 7$	$w = 0$	–
2	20	$n \le 1000$	$w = 0$	1
3	20	–	$w = 0$	1, 2
4	20	$n \le 1000$	–	0, 1, 2
5	20	–	–	0, 1, 2, 3, 4