Problem A. in bloom

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Aliyoungprog tries to conquer N cities with his punk-rock music, yeah! He wants to visit any of these cities, but some of them don't have a road in between! Help him build a minimum amount of roads so that there is a road, between any two cities.

Input

The first line contains two integers n and m - the number of cities and roads. The cities numbered $1, 2, ..., n$. The next m lines describes the roads. Each line contains two integers: which means the road between these cities. It's guaranteed, that there is only one possible road between any to cities.

Output

In the first line print X - the number of required roads. To the next X lines describe the roads.
Each line should contain x and y - the cities in which you build a road.

Examples

standard input	standard output
4 2 1 2 3 4	1 1 3
7 3 4 3 1 7 5 6	3 1 2 2 3 3 5
2 1 1 2	0
4 2 1 3 1 2	1 1 4

Note

You should build a road between least elements of the components! Look at the examples very, very, very close and you'll find an answer :)

Problem B. Zharaskhan's book

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Zharaskhan writes a new book. Writing a book is not easy, and he chooses every word for it. He wants to know if this word was used as a substring in his book or not.

As you know, Zharaskhan is busy, your task is to help him.

The book is empty at first.

Input

In each line of input given one of two types of records.

1. ? <word>;

2. A <text>;

1. Need to check word in the book;

2. Add text to the book;

Output

Need to answer each 1 type of question. «Yes», if the word exists in the book as substring, or «No» if doesn't.

Example

standard input	standard output
? love ? is A Loveis ? love ? WHO A Whoareyou ? is	No No Yes No Yes

Problem C. Maze

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	64 megabytes

Zharaskhan is a genius. He is working on the new version of teleport. In one of the tests, he is teleported by accident to the maze. Because of the need to find a bug of teleport and lack of time he is asked you to help him to find the fastest way to exit from this maze.

Input

In the first line of input given two numbers N and M. ($1 \leqslant N, M \leqslant 1000$). In the next N lines given M symbols, describing maze. In position which Zharaskhan can visit, written symbol «`0`», in other case written symbol «`1`». In the end of maze given x_1, y_1, x_2, y_2 — coordinates of Zharaskhan and cordinates of exit ($1 \leqslant x_1, x_2 \leqslant M$, $1 \leqslant y_1, y_2 \leqslant N$).

Output

One single number the length of the shortest path from (x_1, y_1) to (x_2, y_2), if Zharaskhan can leave maze or «`-1`» if not.

Examples

standard input	standard output
4 6 1 0 1 1 1 0 0 0 1 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0 2 1 5 3	7
4 6 1 0 1 1 1 0 0 0 1 0 0 0 1 0 1 1 0 0 0 0 0 1 0 0 2 1 5 3	-1
5 5 0 0 0 0 0 0 1 1 1 0 0 1 1 1 0 0 1 1 1 0 0 0 0 0 0 1 3 1 3	0

Problem D. Fast text searching

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Textual data still remains the main format for storing information, justifying why text processing is among the most relevant topics in computer science. In this problem, we ask you to apply one the fast text searching algorithms and find number occurrences of string t in string s.

Input

The first line contains two strings s and t. Both strings contain only english letters. String lengths can range from 1 to 100,000 inclusive.

Output

Print the single line - the answer for the given problem.

Example

standard input	standard output
ababbababa aba	3

Problem E. TENET

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Tenet is a 2020 science fiction action-thriller film written and directed by Christopher Nolan, who produced it with Emma Thomas. A co-production between the United Kingdom and United States, it stars John David Washington, Robert Pattinson, Elizabeth Debicki, Dimple Kapadia, Michael Caine, and Kenneth Branagh. The plot follows a secret agent (Washington) as he manipulates the flow of time to prevent World War III. In one of the tasks, he should solve a simple problem. You are given an undirected graph consisting of n vertices and m edges. An undirected graph consists of two sets: set of nodes (called vertices) and set of edges. Each edge connects a pair of vertices. All edges are bidirectional (i.e. if a vertex a is connected with a vertex b, a vertex b is also connected with a vertex a). An edge can't connect vertex with itself, there is at most one edge between a pair of vertices. Two vertices u and v belong to the same connected component if and only if there is at least one path along edges connecting u and v. Your task is to find the number of connected components.

Input

The first line contains two integer numbers n and m ($1 \le n \le 2 \times 10^5$, $0 \le m \le 2 \times 10^5$) — number of vertices and edges. The following m lines contains edges.

Output

Print the single line - the answer for the given problem.

Examples

standard input	standard output
3 3 1 2 1 3 2 3	1
7 4 1 2 3 2 4 5 6 7	3