Counting Rooms

Time limit: 1.00 s
Memory limit: 512 MB

You are given a map of a building, and your task is to count the number of its rooms. The size of the map is $n \times m$ squares, and each square is either floor or wall. You can walk left, right, up, and down through the floor squares.

Input

The first input line has two integers n and m: the height and width of the map. Then there are n lines of m characters describing the map. Each character is either `.` (floor) or `#` (wall).

Output

Print one integer: the number of rooms.

Constraints

- $1 \le n,m \le 1000$

Example

Input:
```
5 8
########
#..#...#
####.#.#
#..#...#
########
```

Output:
```
3
```

Labyrinth

Time limit: 1.00 s

Memory limit: 512 MB

You are given a map of a labyrinth, and your task is to find a path from start to end. You can walk left, right, up and down.

Input

The first input line has two integers n and m: the height and width of the map. Then there are n lines of m characters describing the labyrinth. Each character is `.` (floor), `#` (wall), `A` (start), or `B` (end). There is exactly one `A` and one `B` in the input.

Output

First print "YES", if there is a path, and "NO" otherwise.

If there is a path, print the length of the shortest such path and its description as a string consisting of characters `L` (left), `R` (right), `U` (up), and `D` (down). You can print any valid solution.

Constraints

- $1 \le n,m \le 1000$

Example

Input:

```
5 8
########
#.A#...#
#.##.#B#
#......#
########
```

Output:

```
YES
9
LDDRRRRRU
```

Building Roads

Time limit: 1.00 s

Memory limit: 512 MB

Byteland has
n cities, and m roads between them. The goal is to construct new roads so that there is a route between any two cities. Your task is to find out the minimum number of roads required, and also determine which roads should be built.

Input

The first input line has two integers n and m : the number of cities and roads. The cities are numbered $1,2,\ldots,n$.
After that, there are m lines describing the roads. Each line has two integers a and b: there is a road between those cities.

A road always connects two different cities, and there is at most one road between any two cities.

Output

First print an integer k : the number of required roads.
Then, print k lines that describe the new roads. You can print any valid solution.

Constraints

- $1 \le n \le 10^5$
- $1 \le m \le 2 \cdot 10^5$
- $1 \le a,b \le n$

Example

Input:
```
4 2
1 2
3 4
```

Output:
```
1
2 3
```

Message Route

Time limit: 1.00 s
Memory limit: 512 MB

Syrjälä's network has n computers and m connections. Your task is to find out if Uolevi can send a message to Maija, and if it is possible, what is the minimum number of computers on such a route.

Input

The first input line has two integers n and m: the number of computers and connections. The computers are numbered $1,2,\ldots,n$. Uolevi's computer is 1 and Maija's computer is n.

Then, there are m lines describing the connections. Each line has two integers a and b: there is a connection between those computers.

Every connection is between two different computers, and there is at most one connection between any two computers.

Output

If it is possible to send a message, first print k: the minimum number of computers on a valid route. After this, print an example of such a route. You can print any valid solution.

If there are no routes, print "IMPOSSIBLE".

Constraints

- $2 \le n \le 105$
- $1 \le m \le 2.105$
- $1 \le a,b \le n$

Example

Input:

```
5 5
1 2
```

1 3
1 4
2 3
5 4

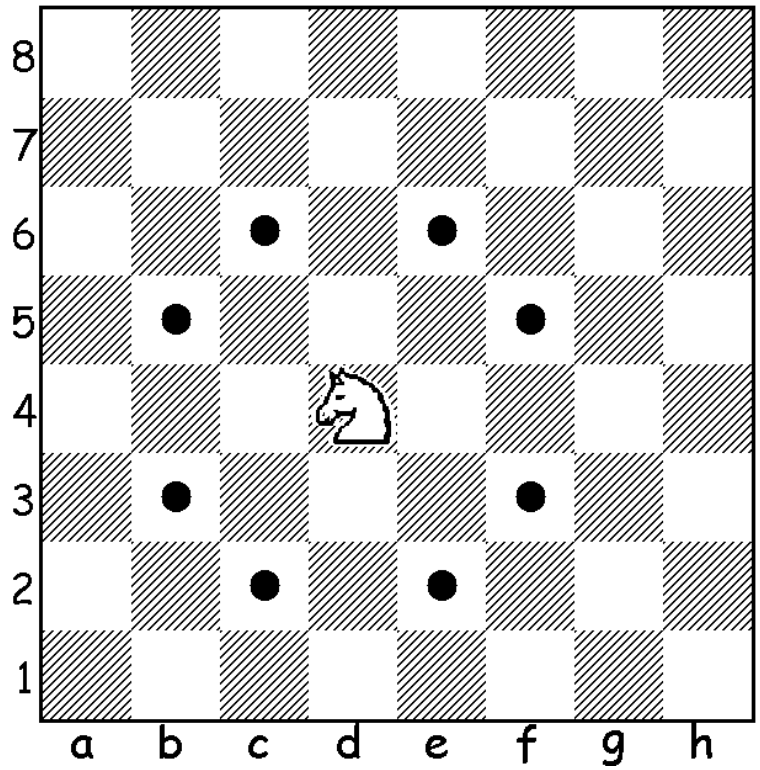
Output:
3
1 4 5

NAKANJ - Minimum Knight moves !!!

#bfs

Anjali and Nakul are good friends. They both had a quarrel recently while playing chess. Nakul wants to know the minimum number of moves a knight takes to reach from one square to another square of a chess board (8 × 8). Nakul is brilliant and he had already written a program to solve the problem. Nakul wants to know whether Anjali can do it. Anjali is very weak in programming. Help her to solve the problem.

A knight can move in the shape of an "L" in a chessboard - two squares either forward, backward, left, or right and then one square to its left or right. A knight move is valid if it moves as mentioned above and it is within the boundary of the chessboard (8 × 8).



Input

There are T test cases in total. The next T lines contain two strings (start and destination) separated by a space.

The strings start and destination will only contain two characters - First character is an alphabet between 'a' and 'h' (inclusive), Second character is a digit between '1' and '8' (inclusive) - (Quotes just for clarity).

To know the knight moves more clearly refer to the above figure.

Output

Print the minimum number of moves a knight takes to reach from start to destination in a separate line.

Constraints

1 <= T <= 4096

Example

Input:

```
3
a1 h8
a1 c2
h8 c3
```

Output:

```
6
1


4
```