# BOI 2026 Day 1

## Language: en

| task | type | time limit | memory limit |
|---|---|---|---|
| **A** Blocks | standard | 1.00 s | 512 MB |
| **B** Island | standard | 1.00 s | 512 MB |
| **C** Tourist's Journey | standard | 1.00 s | 512 MB |

# A Blocks

You have $n$ wooden blocks of $k$ different colors arranged in a line. The colors of the blocks are $c_1, c_2, \ldots, c_n$, all between $1$ and $k$.

A color is *balanced* if the average position of blocks with that color is $(n+1)/2$. Note that this number is not necessarily an integer.


For example, if $7$ blocks are arranged in the above way, the average position of color $1$ is $(1+4+6)/3 = 11/3$, the average position of color $2$ is $(2+3+7)/3 = 4$ and the average position of color $3$ is $5$. Since $(7+1)/2 = 4$, color $2$ is balanced but colors $1$ and $3$ are not.

Can you order the blocks in such a way that all colors are balanced?

**Input**

The first line contains a single integer $t$: the number of test cases.

The following lines describe the test cases, each consisting of two lines as follows:

The first line contains two integers $n$ and $k$: the number of blocks and the number of different colors.

The second line contains the colors of the blocks $c_1, c_2, \ldots, c_n$. There is at least one block of each color.

**Output**

For each test case, print "YES" if a solution exists, and "NO" otherwise. If a solution exists, describe one possible order by printing $n$ integers on another line: the color of the block in each position.

**Constraints**

- $1 \leq t \leq 100$
- $1 \leq k \leq n \leq 2 \cdot 10^5$
- $1 \leq c_1, c_2, \ldots, c_n \leq k$
- The sum of all $n$ is at most $2 \cdot 10^5$

**Example**

Input:

```
3
7 2
1 1 1 1 2 2 2
2 2
1 2
2 1
1 1
```

Output:

```
YES
1 2 2 1 1 1 2
NO
YES
1 1
```

*Explanation*: In the output of the first test case, color $1$ is balanced because its average position is $(1+4+5+6)/4 = 4$, which equals $(n+1)/2$. Similarly, the average position of color $2$ is $(2+3+7)/3 = 4$. Both colors are therefore balanced.

In the second test case, neither of the two possible orders make the colors balanced.

In the output of the third test case, blocks with color $1$ appear at positions $1$ and $2$. The average is $3/2$, so color $1$ is balanced.

**Scoring**

| Subtask | Constraints | Points |
|---|---|---|
| 1 | $n \leq 3$ | 4 |
| 2 | $n \leq 15$ | 13 |
| 3 | There is at most one color that appears an odd number of times | 18 |
| 4 | All colors appear an equal number of times | 23 |
| 5 | $k \leq 15$ | 15 |
| 6 | No additional constraints | 27 |

# B Island

You are given an $n \times n$ grid where each cell is either land or water. The rows and columns of the grid are numbered $1, 2, \ldots, n$. You can move in the grid by taking steps left, right, up or down. Two cells are connected if you can move between them in one or more steps, while staying on the same type of cell.

The land cells form one connected island and the water cells form one connected ocean. The first and last rows and columns contain only water cells.

Your task is to answer $q$ queries: given two land cells $(r_1, c_1)$ and $(r_2, c_2)$, what is the minimum number of steps needed to move from the first cell to the second one while staying on land?

### Input

The first line contains two integers $n$ and $q$: the size of the grid and the number of queries.

The next $n$ lines each have $n$ characters describing the grid. "." is a water cell and "#" is a land cell.

The next $q$ lines each have four integers $r_1$, $c_1$, $r_2$ and $c_2$: the row and column of the first cell, followed by the row and column of the second cell.

### Output

Print the answer to each query on separate lines.

### Constraints

- $3 \leq n \leq 1000$
- $1 \leq q \leq 10^5$
- $1 < r_1, c_1, r_2, c_2 < n$ in all queries

### Example

Input:

```
8 4
........
..####..
.##.###.
.##.###.
.#......
.#####..
..#####.
........
2 3 3 7
4 5 4 5
4 7 7 7
6 2 3 2
```

Output:

```
5
0
17
3
```

**Scoring**

| Subtask | Constraints | Points |
|---|---|---|
| 1 | $n \leq 200$, $q \leq 200$ | 10 |
| 2 | No row or column has any water cells between land cells | 6 |
| 3 | No $2 \times 2$-squares have only land cells | 16 |
| 4 | No row has any water cells between land cells | 28 |
| 5 | No additional constraints | 40 |

# C Tourist's Journey

A country with $n$ cities numbered $1, 2, \ldots, n$ is connected by $m$ two-way roads. There are at most $10$ more roads than the number of cities, but it is still possible to travel between any two cities using one or more roads.

A tourist is planning a journey in the country. They have decided the following:

- The journey will start in city $1$ and end in city $n$.
- The journey should consist of exactly $k$ steps, each traveling one road.
- It is not allowed to travel back and forth along the same road in two consecutive steps. It is possible, however, to travel the same road multiple times if there are other steps in between.

How many possible journey plans are there, traveling from city $1$ to city $n$ in $k$ steps? Two plans are different if they go to different cities at any step.

**Input**

The first line contains three integers $n$, $m$ and $k$: the number of cities and roads in the country, as well as the number of steps in the tourist's journey.

The following $m$ lines describe the roads. Each line contains two distinct integers $u$ and $v$, meaning that there is a road between city $u$ and city $v$. There is at most one road between two cities.

**Output**

Print the number of different journey plans. Since the answer may be large, print it modulo $10^9 + 7$.

**Constraints**

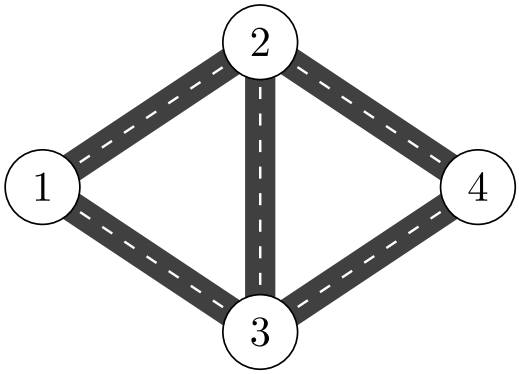
- $2 \leq n \leq 2 \cdot 10^5$
- $n - 1 \leq m \leq n + 10$
- $1 \leq k \leq 10^4$

**Example 1**

Input:
```
4 5 5
1 2
1 3
2 3
2 4
3 4
```

Output:
```
4
```

*Explanation*: The cities and roads of the country are shown in the figure below.




The possible journey plans are:

- $1 \to 2 \to 3 \to 1 \to 2 \to 4$
- $1 \to 3 \to 2 \to 1 \to 3 \to 4$
- $1 \to 2 \to 4 \to 3 \to 2 \to 4$
- $1 \to 3 \to 4 \to 2 \to 3 \to 4$

**Example 2**

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

Output:
```
0
```

*Explanation*: There is no valid journey plan with $4$ steps. Note that the plan $1 \to 2 \to 3 \to 2 \to 4$ is invalid because it uses the road between cities $2$ and $3$ in two consecutive steps.

**Scoring**

| Subtask | Constraints | Points |
|---|---|---|
| 1 | $n, k \leq 10$ | 7 |
| 2 | $n, k \leq 100$ | 8 |
| 3 | $m = n - 1$ | 11 |
| 4 | $m = n - 1$ or $m = n$ | 29 |
| 5 | $n \leq 1000$ | 15 |
| 6 | No additional constraints | 30 |