C - Daydream

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 300 points

Problem Statement

You are given a string S consisting of lowercase English letters. Another string T is initially empty. Determine whether it is possible to obtain $S = T$ by performing the following operation an arbitrary number of times:

- Append one of the following at the end of T: `dream`, `dreamer`, `erase` and `eraser`.

Constraints

- $1 \leqq |S| \leqq 10^5$
- S consists of lowercase English letters.

Input

The input is given from Standard Input in the following format:

```
S
```

Output

If it is possible to obtain $S = T$, print `YES`. Otherwise, print `NO`.

Sample Input 1

```
erasedream
```

Sample Output 1

```
YES
```

Append `erase` and `dream` at the end of T in this order, to obtain $S = T$.

Sample Input 2

```
dreameraser
```

Sample Output 2

```
YES
```

Append `dream` and `eraser` at the end of T in this order, to obtain $S = T$.

Sample Input 3

```
dreamerer
```

Sample Output 3

```
NO
```

D - Connectivity

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 400 points

Problem Statement

There are N cities. There are also K roads and L railways, extending between the cities. The i-th road bidirectionally connects the p_i-th and q_i-th cities, and the i-th railway bidirectionally connects the r_i-th and s_i-th cities. No two roads connect the same pair of cities. Similarly, no two railways connect the same pair of cities.

We will say city A and B are *connected by roads* if city B is reachable from city A by traversing some number of roads. Here, any city is considered to be connected to itself by roads. We will also define *connectivity by railways* similarly.

For each city, find the number of the cities connected to that city by both roads and railways.

Constraints

- $2 \leqq N \leqq 2 * 10^5$
- $1 \leqq K, L \leqq 10^5$
- $1 \leqq p_i, q_i, r_i, s_i \leqq N$
- $p_i < q_i$
- $r_i < s_i$
- When $i \neq j$, $(p_i, q_i) \neq (p_j, q_j)$
- When $i \neq j$, $(r_i, s_i) \neq (r_j, s_j)$

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{l}
N \quad K \quad L \\
p_1 \quad q_1 \\
: \\
p_K \quad q_K \\
r_1 \quad s_1 \\
: \\
r_L \quad s_L
\end{array}
$$

Output

Print N integers. The i-th of them should represent the number of the cities connected to the i-th city by both roads and railways.

Sample Input 1

```
4 3 1
1 2
2 3
3 4
2 3
```

Sample Output 1

```
1 2 2 1
```

All the four cities are connected to each other by roads.

By railways, only the second and third cities are connected. Thus, the answers for the cities are $1, 2, 2$ and 1, respectively.

Sample Input 2

```
4 2 2
1 2
2 3
1 4
2 3
```

Sample Output 2

```
1 2 2 1
```

Sample Input 3

```
7 4 4
1 2
2 3
2 5
6 7
3 5
4 5
3 4
6 7
```

Sample Output 3

```
1 1 2 1 2 2 2
```

E - Manhattan Compass

Time Limit: 3 sec / Memory Limit: 256 MiB

Score : 900 points

Problem Statement

There are N pinholes on the xy-plane. The i-th pinhole is located at (x_i, y_i).

We will denote the Manhattan distance between the i-th and j-th pinholes as $d(i,j)(= |x_i - x_j| + |y_i - y_j|)$.

You have a peculiar pair of compasses, called *Manhattan Compass*. This instrument always points at two of the pinholes. The two legs of the compass are indistinguishable, thus we do not distinguish the following two states: the state where the compass points at the p-th and q-th pinholes, and the state where it points at the q-th and p-th pinholes.

When the compass points at the p-th and q-th pinholes and $d(p,q) = d(p,r)$, one of the legs can be moved so that the compass will point at the p-th and r-th pinholes.

Initially, the compass points at the a-th and b-th pinholes. Find the number of the pairs of pinholes that can be pointed by the compass.

Constraints

- $2 \leqq N \leqq 10^5$
- $1 \leqq x_i, y_i \leqq 10^9$
- $1 \leqq a < b \leqq N$
- When $i \neq j$, $(x_i, y_i) \neq (x_j, y_j)$
- x_i and y_i are integers.

Input

The input is given from Standard Input in the following format:

```
N a b
x_1 y_1
:
x_N y_N
```

Output

Print the number of the pairs of pinholes that can be pointed by the compass.

Sample Input 1

```
5 1 2
1 1
4 3
6 1
5 5
4 8
```

Sample Output 1

```
4
```

Initially, the compass points at the first and second pinholes.

Since $d(1,2) = d(1,3)$, the compass can be moved so that it will point at the first and third pinholes.

Since $d(1,3) = d(3,4)$, the compass can also point at the third and fourth pinholes.

Since $d(1,2) = d(2,5)$, the compass can also point at the second and fifth pinholes.

No other pairs of pinholes can be pointed by the compass, thus the answer is 4.

Sample Input 2

```
6 2 3
1 3
5 3
3 5
8 4
4 7
2 5
```

Sample Output 2

```
4
```

Sample Input 3

```
8 1 2
1 5
4 3
8 2
4 7
8 8
3 3
6 6
4 8
```

Sample Output 3

```
7
```

F - Shuffling

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 900 points

Problem Statement

There is a string S of length N consisting of characters `0` and `1`. You will perform the following operation for each $i = 1, 2, ..., m$:

- Arbitrarily permute the characters within the substring of S starting at the l_i-th character from the left and extending through the r_i-th character.

Here, the sequence l_i is non-decreasing.

How many values are possible for S after the M operations, modulo $1000000007 (= 10^9 + 7)$?

Constraints

- $2 \leqq N \leqq 3000$
- $1 \leqq M \leqq 3000$
- S consists of characters `0` and `1`.
- The length of S equals N.
- $1 \leqq l_i < r_i \leqq N$
- $l_i \leqq l_{i+1}$

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{l}
N \quad M \\
S \\
l_1 \quad r_1 \\
: \\
l_M \quad r_M
\end{array}
$$

Output

Print the number of the possible values for S after the M operations, modulo 1000000007.

Sample Input 1

```
5 2
01001
2 4
3 5
```

Sample Output 1

```
6
```

After the first operation, S can be one of the following three: `01001`, `00101` and `00011`.

After the second operation, S can be one of the following six: `01100`, `01010`, `01001`, `00011`, `00101` and `00110`.

Sample Input 2

```
9 3
110111110
1 4
4 6
6 9
```

Sample Output 2

```
26
```

Sample Input 3

```
11 6
00101000110
2 4
2 3
4 7
5 6
6 10
10 11
```

Sample Output 3

```
143
```