

Contest Duration: 2025-08-09(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250809T2100&p1=248>) - 2025-08-09(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250809T2240&p1=248>) (local time) (100 minutes)

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## F - We're teapots

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Time Limit: 3 sec / Memory Limit: 1024 MiB

Score : 550 points

### Problem Statement

There are  $N$  teapots arranged in a row, numbered from 1 to  $N$  from left to right.

There is a sequence of integers  $(a_1, \dots, a_N)$ , initially with values  $a_1 = \dots = a_N = -1$ .

You will fill each teapot with either tea or coffee so that the following conditions are all satisfied:

- For any two adjacent teapots, at least one of them contains tea.
- For any integer  $i$  satisfying  $1 \leq i \leq N$ , if  $a_i \neq -1$ , then exactly  $a_i$  of teapots  $1, \dots, i$  contain coffee.

You are given  $Q$  queries, which you should process in the given order.

The  $j$ -th query ( $1 \leq j \leq Q$ ) is as follows:

- Change the value of  $a_{X_j}$  to  $Y_j$ . Then, print the number, modulo 998244353, of ways to fill the teapots satisfying the conditions.

### Constraints

- $2 \leq N \leq 2 \times 10^5$
- $1 \leq Q \leq 2 \times 10^5$
- $1 \leq X_j \leq N$  ( $1 \leq j \leq Q$ )
- $-1 \leq Y_j \leq X_j$  ( $1 \leq j \leq Q$ )

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- All input values are integers.
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## Input

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

```
N Q
X1 Y1
:
XQ YQ
```

## Output

Print  $Q$  lines.

The  $j$ -th line ( $1 \leq j \leq Q$ ) should contain the value to be printed for the  $j$ -th query.

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## Sample Input 1

Copy

```
5 6
1 1
4 2
1 0
4 -1
5 1
5 5
```

Copy

## Sample Output 1

Copy

```
5
3
1
8
4
0
```

Copy

- After the operation in the first query,  $a = (1, -1, -1, -1, -1)$ . The ways to fill the teapots satisfying the conditions are the following five ways:
  - Put coffee in teapot 1, and tea in the others.
  - Put coffee in teapots 1, 3, and tea in the others.
  - Put coffee in teapots 1, 3, 5, and tea in the others.
  - Put coffee in teapots 1, 4, and tea in the others.
  - Put coffee in teapots 1, 5, and tea in the others.

- After the operation in the second query,  $a = (1, -1, -1, 2, -1)$ . The ways to fill the teapots satisfying the conditions are the following three ways:
  - Put coffee in teapots 1, 3, and tea in the others.
  - Put coffee in teapots 1, 3, 5, and tea in the others.
  - Put coffee in teapots 1, 4, and tea in the others.
- After the operation in the third query,  $a = (0, -1, -1, 2, -1)$ . The ways to fill the teapots satisfying the conditions are the following one way:
  - Put coffee in teapots 2, 4, and tea in the others.
- After the operation in the fourth query,  $a = (0, -1, -1, -1, -1)$ . The ways to fill the teapots satisfying the conditions are the following eight ways:
  - Put coffee in none of the teapots and tea in all of them.
  - Put coffee in teapot 2, and tea in the others.
  - Put coffee in teapots 2, 4, and tea in the others.
  - Put coffee in teapots 2, 5, and tea in the others.
  - Put coffee in teapot 3, and tea in the others.
  - Put coffee in teapots 3, 5, and tea in the others.
  - Put coffee in teapot 4, and tea in the others.
  - Put coffee in teapot 5, and tea in the others.
- After the operation in the fifth query,  $a = (0, -1, -1, -1, 1)$ . The ways to fill the teapots satisfying the conditions are the following four ways:
  - Put coffee in teapot 2, and tea in the others.
  - Put coffee in teapot 3, and tea in the others.
  - Put coffee in teapot 4, and tea in the others.
  - Put coffee in teapot 5, and tea in the others.
- After the operation in the sixth query,  $a = (0, -1, -1, -1, 5)$ . The number of ways to fill the teapots satisfying the conditions is zero.

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