Contest Duration: 2025-08-02(Sat) 22:00 (http://www.timeanddate.com/worldclock/fixedtime.html?
iso=20250802T2100&p1=248) - 2025-08-02(Sat) 23:40 (http://www.timeanddate.com/worldclock/fixedtime.html?
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F - Random Gathering
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Time Limit: 3 sec / Memory Limit: 1024 MiB

Score : 500 points

Problem Statement

There are N plates arranged from left to right as plate 1, plate $2, \ldots$, plate N. Initially, plate i $(1 \le i \le N)$ contains A_i stones.

You will perform M operations on these plates. In the i-th operation $(1 \le i \le M)$, two integers L_i and R_i are given, and the following operations are performed in order:

- Remove all stones from the $R_i - L_i + 1$ plates: plate L_i, plate $L_i + 1, \ldots$, plate R_i.
- Uniformly randomly choose an integer between L_i and R_i, inclusive, and let it be x.
- Place all the removed stones on plate x.

For $i = 1, 2, \ldots, N$, find the expected number, modulo 998244353, of stones placed on plate i when all M operations are completed.

▶ Finding expected value modulo 998244353

Constraints

- $1 \le N \le 2 \times 10^5$
- $1 \le M \le 2 \times 10^5$
- $0 \le A_i < 998244353 \ (1 \le i \le N)$
- $1 \le L_i \le R_i \le N \ (1 \le i \le M)$

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- All input values are integers.

Input

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

```
N  M
A₁  A₂  ...  Aₙ
L₁  R₁
L₂  R₂
⋮
Lₘ  Rₘ
```

$$N \quad M$$
$$A_1 \quad A_2 \quad \ldots \quad A_N$$
$$L_1 \quad R_1$$
$$L_2 \quad R_2$$
$$\vdots$$
$$L_M \quad R_M$$

Output

Output N integers separated by spaces on a single line. For the i-th $(1 \le i \le N)$, find the expected number, modulo 998244353, of stones placed on plate i when all M operations are completed, and output it.

Sample Input 1   Copy

```
7 4
30 10 40 10 50 90 20
4 6
5 7
1 6
3 7
```

Sample Output 1   Copy

```
35 35 36 36 36 36 36
```

For example, the operations proceed as follows:

- In the first operation, 4 is chosen. The number of stones on plates $1, 2, \ldots, 7$ becomes $30, 10, 40, 150, 0, 0, 20$, respectively.
- In the second operation, 6 is chosen. The number of stones on plates $1, 2, \ldots, 7$ becomes $30, 10, 40, 150, 0, 20, 0$, respectively.
- In the third operation, 2 is chosen. The number of stones on plates $1, 2, \ldots, 7$ becomes $0, 250, 0, 0, 0, 0, 0$, respectively.

- In the fourth operation, 3 is chosen. The number of stones on plates $1, 2, \ldots, 7$ becomes $0, 250, 0, 0, 0, 0, 0$, respectively.

When all operations are completed, the expected number of stones on plates $1, 2$ is 35, and the expected number of stones on plates $3, 4, 5, 6, 7$ is 36, so output 35 35 36 36 36 36 36.

Sample Input 2 Copy

```
2 1
0 1
1 2
```

Sample Output 2 Copy

```
499122177 499122177
```

Note that you need to find the expected value modulo 998244353.

When all operations are completed, for both plates, there is a $\dfrac{1}{2}$ probability that one stone is placed, and a $\dfrac{1}{2}$ probability that no stone is placed. Therefore, the expected number of stones placed is $\dfrac{1}{2}$. We have $499122177 \times 2 \equiv 1 \pmod{998244353}$, so output 499122177 499122177.

Sample Input 3 Copy

```
15 10
61477244 450343304 812961384 836482955 280670539 405068748 318805088 304825858 518212597
2 11
5 9
8 15
6 7
6 8
1 2
1 10
4 9
12 15
6 11
```

Sample Output 3 Copy

449356308 449356308 449356308 449356308 449356308 648148154 648148154 648148154 64814815-

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