LKP '18 Contest 2 P5 - Political Instability

Time limit: 2.5s   **Memory limit:** 256M

After the end of the war, Collea was left in a state of political turmoil. Having been forced to install a democratic government, and with the rise of extremist attitudes throughout the country, the current Collean government is anxious about the coming national election. There are N political parties in Collea, which are conveniently numbered from 1 to N, and current polls show that if the election was to be held today, the ith political party would earn v_i votes. In order for a new government to form, some of the political parties must form a majority coalition where the sum of the votes of the parties in the coalition must be **strictly greater** than half of the total votes. In the D following days, some political parties had their expected number of votes changed. Specifically, on the ith day, the a_ith party's expected number of votes changed to b_i. Help Collea find the minimum number of parties required such that they form a majority coalition for each day.

Constraints

$1 \leq N \leq 300\,000$
$0 \leq D \leq 300\,000$
$0 \leq b_i, v_i \leq 10^9$
$1 \leq a_i \leq N$
It is guaranteed that the total number of votes will always be positive.

Subtask 1 [10%]

$1 \leq N, D \leq 2000$

Subtask 2 [90%]

No additional constraints.

Input Specification

The first line contains two integers, N and D.
The second line contains N integers, $v_1, v_2, \ldots, v_N$.
D lines follow, the ith of which contains the integers a_i and b_i.

Output Specification

On the first line, output one integer, the minimum possible number of parties in a majority coalition before the D days. Output D more lines, the ith of which containing one integer, the minimum possible number of parties in a majority coalition after the ith day.

Sample Input

```
5 3
3 1 5 2 2
2 3
5 3
4 5
```

Sample Output

```
2
2
3
2
```