Odd and Even

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	1024 megabytes

Given an integer sequence $A = a_1, a_2, \cdots, a_k$ of length k, you can split it into several non-empty contiguous subarrays such that each element belongs to exactly one subarray. For each subarray, we calculate the sum of its elements. Let p be the number of subarrays with an odd sum, and q be the number of subarrays with an even sum.

You need to answer m queries about this sequence. Each query is denoted as an integer r, and you need to find the maximum possible values of p and q under the condition that $p + q = r$, respectively.

As sequence A might be long, we'll describe it in run-length encoding. More formally, given n pairs of integers $(v_1, l_1), (v_2, l_2), \cdots, (v_n, l_n)$, sequence A is derived as follows: starting from an empty sequence, first append v_1 to the back of the sequence l_1 times, then append v_2 to the back of the sequence l_2 times, ..., finally append v_n to the back of the sequence l_n times. See the explanation of the sample test case below for an example.

Input

There is only one test case in each test file.

The first line contains two integers n and m ($1 \le n, m \le 2 \times 10^5$), indicating the length of the run-length encoding of the sequence, and the number of queries.

For the following n lines, the i-th line contains two integers v_i and l_i ($1 \le v_i, l_i \le 10^9$). Therefore, the length of sequence A can be calculated as $k = \sum_{i=1}^{n} l_i$. It is guaranteed that $v_i \neq v_{i+1}$ for all $1 \le i < n$.

For the following m lines, the i-th line contains an integer r_i ($1 \le r_i \le k$), indicating the i-th query.

Output

For each query, output one line containing two integers separated by a space, indicating the maximum possible values of p and q under the condition that $p + q = r$, respectively.

Example

standard input	standard output
3 6 5 3 2 2 7 1 1 2 3 4 5 6	0 1 2 2 2 1 4 2 4 3 4 2

Note

For the sample test case, $A = 5, 5, 5, 2, 2, 7$.

For the second query, we need to split the sequence into 2 contiguous subarrays.

- To maximize the number of subarrays with odd sums, we can split A into $5, 5, 5 \,|\, 2, 2, 7$. Both subarrays have odd sums, so the maximum possible p is 2.

- To maximize the number of subarrays with even sums, we can split A into $5, 5 \,|\, 5, 2, 2, 7$. Both subarrays have even sums, so the maximum possible q is 2.

For the fifth query, we need to split the sequence into 5 contiguous subarrays.

- To maximize the number of subarrays with odd sums, we can split A into $5 \,|\, 5 \,|\, 5 \,|\, 2, 2 \,|\, 7$, where 4 of them have odd sums, so the maximum possible p is 4.
- To maximize the number of subarrays with even sums, we can split A into $5, 5 \,|\, 5 \,|\, 2 \,|\, 2 \,|\, 7$, where 3 of them have even sums, so the maximum possible q is 3.