Festival Decorating

Input file:	*standard input*
Output file:	*standard output*
Time limit:	9 seconds
Memory limit:	1024 mebibytes

To celebrate the coming winter festival in Byteland, the main street, which can be regarded as the x-axis, is decorated with n colorful lamps, labeled by $1, 2, \ldots, n$. The x-coordinate of the i-th lamp is x_i, and the color of the i-th lamp is c_i. No two lamps share the same x-coordinate.

You will be given q queries. In the i-th query, you will be given an integer d_i ($1 \le d_i \le 250\,000$), and you need to find the lamp u ($1 \le u \le n$) with the minimum index such that there is another lamp located at $x_u + d_i$ and the color of that lamp is different from c_u, or determine it is impossible to find such u. **Your answer is considered correct if its absolute or relative error does not exceed** 0.5**.**

Input

The first line of the input contains two integers n and q ($1 \le n, q \le 250\,000$) denoting the number of lamps and the number of queries.

Each of the next n lines contains two integers x_i and c_i ($1 \le x_i \le 250\,000$, $1 \le c_i \le n$) denoting the x-coordinate and the color of the i-th lamp. It is guaranteed that no two lamps share the same x-coordinate.

Each of the next q lines contains a single integer d_i ($1 \le d_i \le 250\,000$) denoting the i-th query.

Output

For each query, print a line containing a single number: the minimum index u you found. If it is impossible to find such u, print 0 instead.

Your answer is considered correct if its absolute or relative error does not exceed 0.5. Note that this means you can output a non-integer as well.

Formally, let your answer be u, and the jury's answer be u'. Your answer is accepted if and only if:

$$\frac{|u - u'|}{\max(1, |u'|)} \le 0.5.$$

Example

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