

Slope

Input file: **standard input**
Output file: **standard output**
Time limit: 8 seconds
Memory limit: 512 megabytes

There are n points (x_i, y_i) in the plane, and all x_i 's are different.

You have to process q queries. Each query determines a subset of the n given points within the rectangle $[x_l, x_r] \times [y_l, y_r]$; and the subset consists of all point i that satisfies $x_l \leq x_i \leq x_r$ and $y_l \leq y_i \leq y_r$. The answer to the query is the minimal value of $|\frac{y_i - y_j}{x_i - x_j}|$, where i and j are different points in the subset described above and $|a|$ is the absolute value of a . If the subset contains less than two points, please refer to the output section.

Input

The first line contains two positive integers n and q ($1 \leq n \leq 7 \times 10^3$ and $1 \leq q \leq 7 \times 10^5$).

The i -th line of the next n lines contains two integers x_i and y_i ($-10^9 \leq x_i, y_i \leq 10^9$).

In the next q lines, each contains four integers x_l, x_r, y_l , and y_r ($-10^9 \leq x_l \leq x_r \leq 10^9$ and $-10^9 \leq y_l \leq y_r \leq 10^9$) that constitute a query.

Output

The output consists of q lines. The i -th line contains two non-negative coprime integers a and b , which represent the answer $\frac{a}{b}$ to the i -th query. If $a = 0$, you should print '0 1'. If the subset contains less than two points, you should print '1 0'.

Example

standard input	standard output
5 5	2 1
16 12	2 5
11 14	0 1
15 6	6 1
1 14	2 1
2 16	
1 2 13 17	
10 17 12 14	
1 17 11 19	
15 16 6 12	
11 15 1 19	