Problem I. Range Closest Pair of Points Query

Input file:	`standard input`
Output file:	`standard output`
Time limit:	7 seconds
Memory limit:	1024 megabytes

The closest pair of points problem is a well-known problem of computational geometry. In this problem, there are n points $p_1, p_2, \ldots, p_n$ in the Euclidean plane. You will be given q queries. In the i-th query, you will be given two integers l_i and r_i ($1 \le l_i < r_i \le n$). You need to find a pair of points (u, v) such that $l_i \le u < v \le r_i$ and the Euclidean distance $\sqrt{(x_u - x_v)^2 + (y_u - y_v)^2}$ between point p_u and p_v is minimized.

Input

The first line of the input contains two integers n and q ($2 \le n \le 250\,000$, $1 \le q \le 250\,000$), denoting the number of points and the number of queries.

In the next n lines, the i-th line contains two integers x_i and y_i ($1 \le x_i, y_i \le 10^8$), describing the coordinate of p_i.

Each of the next q lines contains two integers l_i and r_i ($1 \le l_i < r_i \le n$), denoting a query.

Output

For each query, print a single line containing an integer, denoting the value of $(x_u - x_v)^2 + (y_u - y_v)^2$.

Examples

standard input	standard output
5 5 2 4 1 1 3 3 5 1 4 2 1 5 2 3 2 4 3 5 1 3	2 8 8 2 2
2 1 1 1 1 1 1 2	0