

Problem I. Range Closest Pair of Points Query

Input file: standard input
Output file: standard output
Time limit: 9 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, \dots, 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 ($1 \leq l_i < r_i \leq n$). You need to find a pair of points (u, v) such that $l_i \leq u < v \leq r_i$ 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 ($2 \leq n \leq 250\,000$, $1 \leq q \leq 250\,000$), 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 ($1 \leq x_i, y_i \leq 10^8$), describing the coordinate of p_i .

Each of the next q lines contains two integers l_i and r_i ($1 \leq l_i < r_i \leq n$), 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
2 4	8
1 1	8
3 3	2
5 1	2
4 2	
1 5	
2 3	
2 4	
3 5	
1 3	
2 1	0
1 1	
1 1	
1 2	