F - Manhattan Christmas Tree 2

Editorial (/contests/abc437/tasks/abc437_f/editorial)

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Time Limit: 3 sec / Memory Limit: 1024 MiB

Score : 500 points

Problem Statement

There are N Christmas trees on a two-dimensional plane. The i-th $(1 \leq i \leq N)$ Christmas tree is located at coordinates (X_i, Y_i).

You are given Q queries. Process the queries in order. Each query is one of the following:

- Type 1 : Given in the form `1 i x y`. Change the coordinates of the i-th Christmas tree to (x, y).
- Type 2 : Given in the form `2 L R x y`. Output the Manhattan distance from the coordinates (x, y) to the farthest Christmas tree among the $L, L+1, \ldots, R$-th Christmas trees.

Here, the Manhattan distance between coordinates (x_1, y_1) and coordinates (x_2, y_2) is defined as $|x_1 - x_2| + |y_1 - y_2|$.

Constraints

- $1 \leq N, Q \leq 2 \times 10^5$
- $-10^9 \leq X_i, Y_i \leq 10^9$
- $1 \leq i \leq N$
- $1 \leq L \leq R \leq N$

- $-10^9 \leq x, y \leq 10^9$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \quad Q \\
&X_1 \quad Y_1 \\
&X_2 \quad Y_2 \\
&\vdots \\
&X_N \quad Y_N \\
&\mathrm{query}_1 \\
&\mathrm{query}_2 \\
&\vdots \\
&\mathrm{query}_Q
\end{aligned}
$$

Here, the i-th query query_i is given in one of the following formats:

$$1 \quad i \quad x \quad y$$

$$2 \quad L \quad R \quad x \quad y$$

Output

Output the answers to the queries, separated by newlines, according to the instructions in the problem statement.

Sample Input 1 Copy

Copy

```
3 4
-1 -1
1 2
-2 1
2 1 2 0 0
2 1 3 -1 2
1 1 0 1
2 1 3 -1 2
```

Sample Output 1 Copy

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```
3
3
2
```

Initially, the 1st, 2nd, 3rd Christmas trees are located at coordinates $(-1, -1)$, $(1, 2)$, $(-2, 1)$, respectively.

Each query is processed as follows:

- The Manhattan distances from the 1st and 2nd Christmas trees to coordinates $(0, 0)$ are 2 and 3, respectively. Thus, output 3, which is the maximum value among $2, 3$.
- The Manhattan distances from the 1st, 2nd, 3rd Christmas trees to coordinates $(-1, 2)$ are $3, 2, 2$, respectively. Thus, output 3, which is the maximum value among $3, 2, 2$.
- Change the coordinates of the 1st Christmas tree to $(0, 1)$. The coordinates of the 1st, 2nd, 3rd Christmas trees become $(0, 1)$, $(1, 2)$, $(-2, 1)$, respectively.
- The Manhattan distances from the 1st, 2nd, 3rd Christmas trees to coordinates $(-1, 2)$ are $2, 2, 2$, respectively. Thus, output 2, which is the maximum value among $2, 2, 2$.

Sample Input 2

```
5 7
-9 5
-2 -9
10 -6
9 8
2 9
1 3 -9 -6
2 3 4 2 7
1 4 -2 -10
2 1 2 0 -10
2 3 4 10 -9
2 3 4 8 7
2 5 5 0 2
```

Sample Output 2

```
24
24
22
30
9
```

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