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F - Manhattan Christmas Tree 2

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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 $L, L + 1, \dots, R$ -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

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

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

Input

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

```

N  Q
X1 Y1
X2 Y2
⋮
XN YN
query1
query2
⋮
queryQ

```

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

```
1  i  x  y
```

```
2  L  R  x  y
```

Output

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

Sample Input 1

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```

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

```

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Sample Output 1

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```
3
3
2
```

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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

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```
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
```

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Sample Output 2

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```
24
24
22
30
9
```

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