

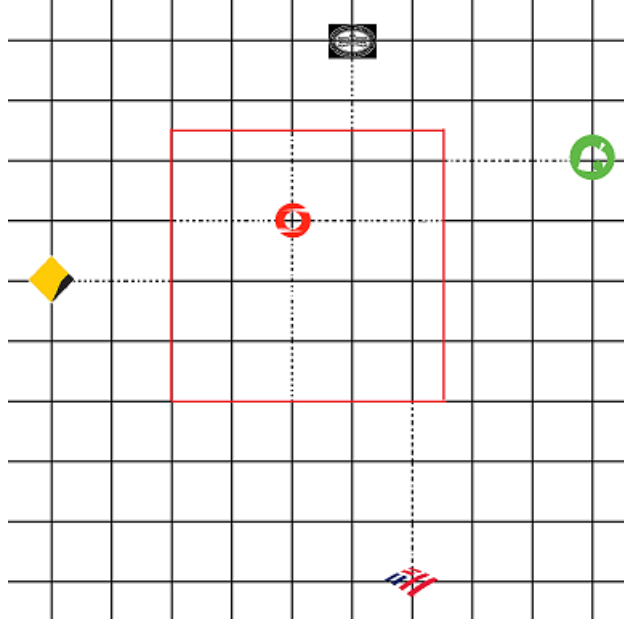
## Rdist

Mr Vien is a great tycoon. It is said that:

“Where Vien drops a wallet, a bank pops up. Where the bank pops up, a new nation is built”

Suppose the Earth is a Cartesian plane

Define  $R(x, y)$  as the territory of the country whose bank is placed at  $(x, y)$ . This territory include every point **(integral or not)**  $(x', y')$  that satisfies:  $|x - x'| \leq |x_1 - x'|$  và  $|y - y'| \leq |y_1 - y'|$  for every points  $(x_1, y_1)$  that accomodates another bank.

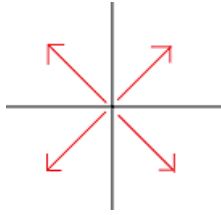


Define  $D(P, A)$  for  $P = (u, v)$  as the shortest distance from  $(u, v)$  to  $A$ . In other words,  $D(P, A) = \min(|u - x| + |v - y|) \forall (x, y) \in A$ .

Define  $G(u, v, S_0, S_1)$  ( $S_0, S_1 \in \{<=, >=\}$ ) as points in the  $S_0 S_1$  “quadrant” of  $(u, v)$ . In other words:  $G(u, v, S_0, S_1) = \{(u', v') \mid u' S_0 u \text{ \& } v' S_1 v\}$

You have to process queries of 2 types:

- 1  $x \ y$ : Vien drops a wallet while travelling to  $(x, y)$ , i.e., A bank appears at  $(x, y)$  and a nation is built accordingly.
- 2  $u \ v \ S_0 \ S_1$  ( $S_0, S_1 \in \{<=, >=\}$ ): Vien is currently at the point  $P = (u, v)$  and he wants to visit the furthest country possible in the  $S_0 S_1$  quadrant. In other words, you need to calculate:  $\max(D(P, R'(x, y)))$  ( $R'(x, y) = R(x, y) \cap G(u, v, S_1, S_2)$ ) for every points  $(x, y)$  that accomodates a bank.



**Note:** The creation of a nation may change the territory of one or several other nations.

## Input

- The first line has integer  $T$  - the subtask containing the test.
- The second line has integer  $Q$  - the number of queries.
- $Q$  lines contains a query  $1\ x\ y$  or  $2\ u\ v\ S_0\ S_1$

## Output

For each query of type 2, print the answer to the  $1^{st}$  decimal digit. If Vien cannot reach any country, print  $-1$

## Constraints

- $Q \leq 250,000$
- $0 \leq x, y, u, v \leq 100,000,000$
- It is guaranteed that there is at least one query of each type, and the first query is of type 1.

## Subtask

- Subtask 1 (15%): All  $x$  coordinate of the banks are equal.
- Subtask 2 (15%):  $Q \leq 1000$
- Subtask 3 (20%): All type 1 queries come before any type 2 queries.
- Subtask 4 (20%): All  $x$  coordinates are different and all  $y$  coordinates are different.
- Subtask 3 (30%): No additional constraints.

## Sample

### Input

```
2
16
1 2 2
1 8 7
1 14 5
2 9 1 >= >=
```

```

1 4 6
1 2 8
1 10 8
1 11 3
2 16 10 >= >=
1 5 3
1 4 1
1 7 5
1 7 8
2 11 5 <= <=
2 3 5 >= <=
2 7 3 <= >=
Output
2
-1.0
10.5
9.5
8.5

```

### **Output**

```

5
-1
10.5
9.5
8.5

```