Problem L. Master of Both V

Input file:	*standard input*
Output file:	*standard output*
Time limit:	5 seconds
Memory limit:	1024 mebibytes

Prof. Chen is the master of data structures and computational geometry. Recently, he taught Putata and Budada the definition of a convex polygon. A convex polygon is a simple polygon (that is, no two vertices coincide and no two edges intersect unless two consecutive edges intersect at a vertex) with all interior angles strictly less than π.

Putata and Budada solved the convex checker problem. But Prof. Chen asked them to go further. Now, they have to maintain a multiset of segments S, initially empty, and support the following two types of queries:

- "`+` px py qx qy": insert a segment with endpoints (px, py) and (qx, qy) into the multiset S.
- "`-` i", erase the segment inserted in the i-th query. It is guaranteed that the i-th query is an insertion query, and the corresponding segment is currently in the multiset.

After each query, Putata and Budada need to answer if there exists a convex polygon $\mathcal{C}$ with the following property. Let the vertices of the convex polygon be $p_0, p_1, p_2, \ldots, p_{m-1}$ in counter-clockwise order. For every segment $u \in S$, there exists an integer $j \in \{0, 1, 2, \ldots, m-1\}$ such that $u \subseteq p_j p_{(j+1) \bmod m}$. For two segments e and f, we say $e \subseteq f$ if and only if, for every point $z \in e$, this point $z \in f$.

Please help Putata and Budada to solve this problem.

Input

Each test contains multiple test cases. The first line contains a single integer t ($1 \le t \le 5 \cdot 10^5$) denoting the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 5 \cdot 10^5$) denoting the number of queries.

Each of the following n lines contains one query. The query begins with a character op ($op \in \{+, -\}$).

If $op =$ `+`, then four integers px, py, qx, and qy ($-10^9 \le px, py, qx, qy \le 10^9$) follow, denoting an inserting query. It is guaranteed that $px \ne qx$ or $py \ne qy$.

Otherwise, an integer i ($1 \le i \le n$) follows, denoting an erasing query. It is guaranteed that the i-th query is an inserting query, and the corresponding segment is currently in the multiset.

It is guaranteed that the sum of n over all test cases does not exceed $5 \cdot 10^5$.

Output

For each test case, print a line consisting of `0`s and `1`s. The i-th character must be `1` if the answer is true after the i-th query, otherwise it must be `0`.

Example

standard input	*standard output*
4 8 + 0 0 1 0 + 5 5 1 3 + 2 0 2 1 + 9 7 6 2 + 1 2 2 2 - 4 + 0 1 0 2 - 2 5 + 0 0 1 1 + 0 1 1 2 + 0 2 1 3 - 2 + 1 1 10 10 4 + 0 0 1 1 + 0 0 1 0 + 0 0 0 1 - 1 4 + 0 0 1 1 + 0 0 1 1 - 1 - 2	11000001 11011 1101 1111