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Algorithms Lab

Exercise – *Motorcycles*

It is an old biker's dream to ride forever into the sunrise. Alas, not everybody manages to live the dream. Who will drive on forever? Consider n bikers that start on the y-axis and ride east, into the positive x-halfplane. All bikers start at the same time and drive with the same speed. Every biker follows a straight path. However, if a biker runs into the tracks of another biker, she loses the desire to continue on the trip and stops right there. (The point of riding into the sunrise is to boldly go where no . . . well, at least not follow someone else's tracks.)

Input The first line of the input contains the number $t \leq 30$ of test cases. Each of the t test cases is described as follows.

- It starts with a line that contains a single integer `n` so that $1 \leq n \leq 5 \cdot 10^5$. Here n denotes the number of bikers.
- The following n lines define the starting positions and driving directions of the bikers $b_0, \ldots, b_{n-1}$. Each line contains three integers $\mathtt{y}_0$ $\mathtt{x}_1$ $\mathtt{y}_1$ separated by a space and such that $x_1 > 0$ and $|y_0|, x_1, |y_1| < 2^{51}$. The corresponding biker starts at position $(0, y_0)$ and rides off from there in direction of the point (x_1, y_1). Note that the point (x_1, y_1) specifies the direction not the destination. That is, the biker does not stop if she reaches this point.

You may assume that the starting positions are pairwise distinct.

Output For each test case output a single line that lists the indices of all bikers that ride forever into the sunrise (as defined below), sorted in increasing order and so that every index is followed by a space. Recall that the bikers are indexed with $0, \ldots, n-1$.

A biker *rides forever into the sunrise* if she does not ever meet the tracks of any other biker (that is, a point where another biker has been to earlier than her). In case two bikers reach the same spot at exactly the same time, by the usual traffic regulations the biker that comes from the right takes precedence and continues her drive; the biker that came from the left ends her journey there.

Points There are five groups of test sets, each worth 20 points. So there are 100 points to obtain in total.

1. For the first group of test sets you may assume that $n \leq 5 \cdot 10^2$ and that no biker moves downward ($y_1 \geq y_0$).
2. For the second group of test sets you may assume that $n \leq 5 \cdot 10^3$, that no biker moves downward ($y_1 \geq y_0$), and that no more than 50 bikers ride forever into the sunrise.
3. For the third group of test sets you may assume that $n \leq 5 \cdot 10^4$ and that no biker moves downward ($y_1 \geq y_0$).
4. For the fourth group of test sets there are no additional assumptions.
5. For the fifth group of test sets, which is hidden, you may assume that $n \leq 5 \cdot 10^4$.

Corresponding sample test sets are contained in `test`i`.in/out`, for $i \in \{1, 2, 3, 4\}$.

Sample Input

```
2
4
1 4 2
-1 6 3
2 1 3
0 2 1
3
1 1 0
2 2 0
-1 1 0
```

Sample Output

```
0 2
2
```