B – Missing Boundaries

Memory limit: 1024 MB
Time limit: 4 s

AMPPZ 2023
2023-11-05

amppz

An interval of integers $[1, L]$ was split into N non-empty intervals of integers $[a_i, b_i]$ ($1 \leq a_i \leq b_i \leq L$, for $1 \leq i \leq N$) in such a way that every integer in $[1, L]$ belongs to exactly one of the intervals $[a_i, b_i]$. Then, some of the boundaries of the obtained intervals $[a_i, b_i]$ were hidden.

You are given a set of intervals in which some boundaries may be missing. Your task is to determine if they could have been produced by the method described above, meaning that it is possible to replace the missing values in such a way that the intervals are non-empty, pairwise disjoint, and together they cover all integers from 1 to L.

Input

The first line of the input contains an integer T ($1 \leq T \leq 30\,000$) indicating the number of test cases. Then there are T descriptions of test cases, one after the other.

The first line of each individual test case description contains two integers N and L ($1 \leq N \leq 200\,000$, $1 \leq L \leq 10^9$), indicating respectively the number of given intervals and the length of the original interval that would be split into parts. Each of the following N lines contains two integers, a_i and b_i ($-1 \leq a_i, b_i \leq L$; $a_i, b_i \neq 0$). The number -1 denotes a missing value. If both numbers a_i and b_i are positive, then $a_i \leq b_i$.

The sum of the numbers N in all test cases is not greater than 200 000.

Output

The output should contain exactly T lines. The i-th line should contain the answer to the i-th test case: the word `TAK` if the intervals described in the input could have been generated using the method described in the task, or the word `NIE` if it is not possible.

Example

For the input data:

```
3
4 51
1 -1
11 50
-1 -1
-1 10
3 2
-1 -1
-1 -1
-1 -1
2 3
1 2
2 3
```

the correct result is:

```
TAK
NIE
NIE
```

Explanation of the example: In the first test case, we have $L = 51$, and the interval $[1, 51]$ can be split, for example, into intervals $[1, 7]$, $[8, 10]$, $[11, 50]$, and $[51, 51]$. After hiding some values, these intervals match the given intervals $[1, -1]$, $[-1, 10]$, $[11, 50]$, and $[-1, -1]$. Therefore, the answer to this test case is `TAK`.

In the second test case, we have 3 intervals, all of which have all boundaries hidden. However, the interval $[1, 2]$ contains only two integers, so it is impossible to split it into 3 non-empty and disjoint intervals of integers. Therefore, the answer to this test case is `NIE`.

In the third test case, we have two intervals $[1, 2]$ and $[2, 3]$ with no missing boundaries. The number 2 is covered twice so the answer is `NIE`.