Problem F: Flower Garden

Time limit: 30s, memory limit: 1GB.

In front of the Bytingham Palace there is a beautiful garden. Every year masses of travellers wish to see this wonder with their own eyes. The King Intles III has been investing for years mainly in its length, so as many as $3n$ flowers can be planted in a row.

The current gardener, who invested a lot of energy in this majestic subject of the royal pride, has recently decided to retire early, even before turning forty years old. You have just arrived at the palace to take over his role and although the glimpse at the face of your predecessor made you question your abilities to estimate age of other people, you eagerly accepted the job offer. Now the first task awaits you!

King Intles has decided that two kinds of flowers will be planted in the garden this year: violets and roses. They have to conform to the scheme, which is defined by the multi-page royal decree. The first page states as follows:

Flower beds for violets and roses are numbered from 1 *to* $3n$.

The next pages state:

At least one of the following conditions must be satisfied:

- *All flowers planted on beds from* a_i *to* b_i *inclusive must be roses.*
- *All flowers planted on beds from* c_i *to* d_i *inclusive must be violets.*

You are astonished to find q pages with almost the same instructions, differing only by values of a_i, b_i, c_i, d_i. It is not that bad so far, but there is also one terrifying statement on the last page:

There are $2n$ *roses and* $2n$ *violets available.*

Suddenly you remember the face of the gardener you saw when coming to the royal palace and you start regretting your decision. Is this task even solvable? Find an assignment of the flowers that meets the conditions, or determine that it does not exist (and start considering how to avoid the king's fury).

Input

The first line of input contains the number of test cases z ($1 \leqslant z \leqslant 10^5$). The descriptions of the test cases follow.

The first line of each test case contains two integers n and q ($1 \leqslant n \leqslant 33\,333, 1 \leqslant q \leqslant 10^5$).

Next q lines contain the description of the royal decree. Each i-th line consists of four numbers a_i, b_i, c_i, d_i ($1 \leqslant a_i \leqslant b_i \leqslant 3n, 1 \leqslant c_i \leqslant d_i \leqslant 3n$) with the meaning described in the problem statement.

Sum of n in all test cases does not exceed 333 333. Sum of q in all test cases does not exceed 10^6.

Output

For each test case, in the first line print a single word `TAK` if it is possible to plant all the flowers according to the rules, or `NIE` otherwise.

If the answer is affirmative, in the second line output a string of length $3n$, consisting of characters `F` and `R`. Character `F` at the i-th position of this string means that the i-th flower planted in the row should be violet, and character `R` means the rose. This string must not contain more than $2n$ characters `F` nor more than $2n$ characters `R`.

Example

For an example input:	A possible correct output is:
2 1 3 1 1 2 2 1 2 3 3 1 1 3 3 1 3 1 1 2 2 2 2 3 3 3 3 1 1	TAK RFF NIE