

5081 Expansion

There are N countries exploring a new discovered planet, which is represented as a grid in a Cartesian plane. At the beginning, each country occupies a separate (non-overlapping) territory. The territory has the shape of a rectangle whose edges are parallel to the axes Ox and Oy . The territory is determined by four numbers x_1, y_1, x_2, y_2 where (x_1, y_1) is the coordinate of the bottom left corner and (x_2, y_2) is the coordinate of the top right corner of the rectangle ($10^{-8} \leq x_1, y_1, x_2, y_2 \leq 10^8$). Every month, each country expands its territory to one of four directions: **left** — the new territory is determined by $x_1 - 1, y_1, x_2, y_2$; **right** — the new territory is determined by $x_1, y_1, x_2 + 1, y_2$; **up** — the new territory is determined by $x_1, y_1, x_2, y_2 + 1$; and **down** — the new territory is determined by $x_1, y_1 - 1, x_2, y_2$. The conflict happens between two countries when their territories start to overlap each other (the area of the overlapped region is non-zero). Given the plan of expansion of these countries for the next T months, your task is to write a program to determine after how many months, the first conflict will happen.

Input

The input file consists of several data sets. The first line of the input file contains the number of data sets which is a positive integer and is not bigger than 20. The following lines describe the data sets.

For each data set, the first line contains two integers N and T ($N \leq 100, T \leq 100000$). For the i -th pair of consecutive lines of the following N pairs of consecutive lines, the first line contains four integers x_1, y_1, x_2, y_2 separated by a space determining the initial territory of the i -th country; and the second line consists of a string of length T only containing 'L', 'R', 'U', 'D' characters describing the plan of expansion of the i -th country for the next T months where 'L' means left, 'R' means right, 'U' means up, and 'D' means down.

Output

For each data set, write in one line the number of months after which the first conflict will happen, or '-1' if no conflict happens.

Sample Input

```
2
3 6
1 1 2 2
LLURRR
1 3 2 4
LLLLLL
4 1 5 2
LUUUUU
3 10
1 1 2 2
LLLLLLLLLL
1 3 2 4
RRRRRRRRRR
4 1 5 2
DDDDDDDDDD
```

Sample Output

5
-1