

Problem I. Robots

Input file: *standard input*
 Output file: *standard output*
 Time limit: 2 seconds
 Memory limit: 512 mebibytes

Snuke has N robots. They are numbered 1 through N . Initially, the robot i is placed at (x_i, y_i) , and the direction the robot is initially facing is d_i . Here, d_i is one of 'U', 'D', 'L', and 'R': they represent the y -plus direction, the y -minus direction, the x -minus direction, and the x -plus direction, respectively. Robots and Snuke are considered points on the plane.

Initially, no robots are moving. However, when a robot is touched by something (Snuke or another robot), it will immediately start moving in the direction it is facing with unit speed. These robots are made of strange material and they can pass through other robots. Once a robot starts moving, it keeps moving no matter what happens; even if it touches another robot, it won't change its direction and speed.

Snuke touched the robot 1 at time 0. Compute the coordinates of each robot at time T .

Input

First line of input contains two integers N and T ($1 \leq N \leq 10^5$, $0 \leq T \leq 10^{18}$). The i -th of next N lines contains two integers x_i and y_i and letter d_i — initial coordinates and direction of i -th robot ($0 \leq x_i, y_i \leq 10^9$, d_i is one of the following characters: 'U', 'D', 'L', 'R'). At time 0, no two robots are at the same position.

Output

Print N lines. In the i -th line, print the coordinates of the robot i at time T .

Example

standard input	standard output
5 10	1 10
1 0 U	3 6
3 1 U	9 2
1 2 R	-8 1
1 1 L	8 1
0 1 R	