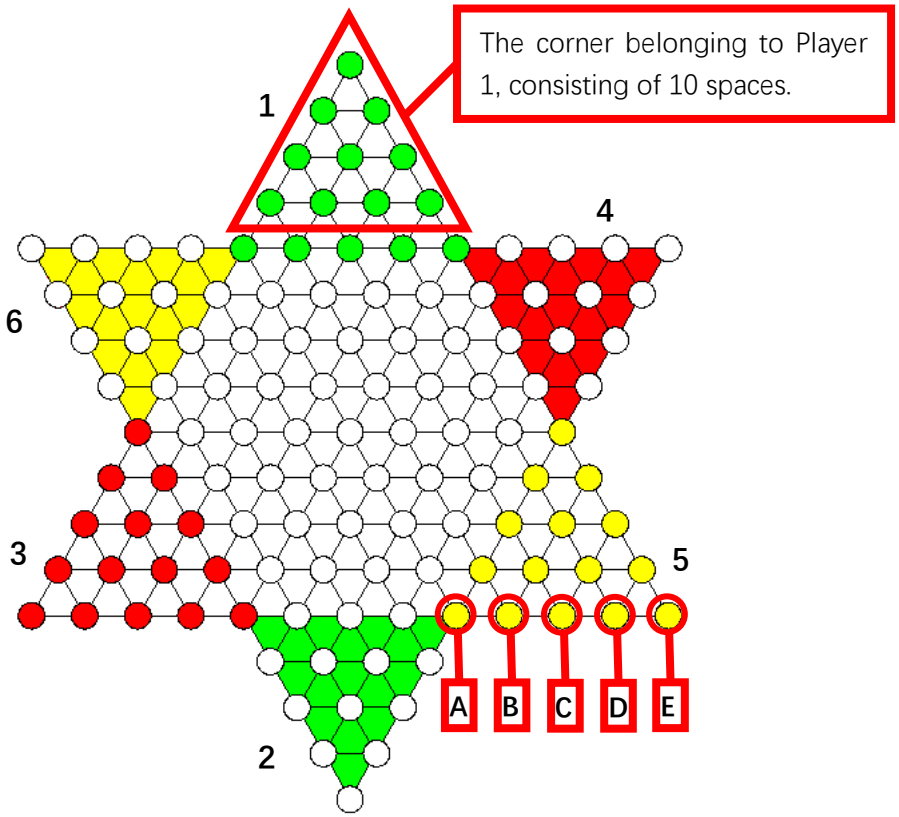
Problem D. Chinese Checkers

Description

Chinese checkers is a strategy board game, which can be played by two, three, four, or six people, playing individually or with partners.



Six players are playing a new version of Chinese checkers, whose rules are different from the traditional ones.

1. The figure shows the shape of the board and the corner belonging to each player. A circle in the figure represents a space. Obviously, the board has 17 rows, and different rows may have different number of spaces. The corner belonging to each player consists of 10 spaces.
2. Each player has 10 pieces. At the beginning of the game, each player puts all his/her pieces on his/her corner and each piece occupies a space.
3. Players take turns moving a single piece, either by moving one step to an adjacent empty space, or by jumping over a symmetrical pattern (which includes at least one piece) to an empty space in one of six directions (left, right, upper left, upper right, lower left, lower right).

   For example, when E is an empty space, a piece can jump from A to E if and only if:

   1) there is a piece at C while B and D are empty spaces,
   2) or there are two pieces at B and D while C is an empty space,
   3) or there are three pieces at B, C and D.

   When D is an empty space, a piece can jump from A to D if and only if there are two pieces at B and C.

4. Player 1 take action first, and then Player 2, and so on.
5. A player can never move his pieces into others' corner except the corner opposite to his corner. For example, Player 6 can move his pieces into his own corner or Player 5's corner.

When the six players take their turns, they choose a piece and a direction, and then they always move the piece to the farthest possible space. Given the pieces and the directions that they choose during the first N turns, can you tell where their pieces located?

Input

The input consists of multiple test cases. (Up to 1000)

For each test case:

The first line contains an integer N, indicating the number of turns. $(1 \leq \sum N \leq 10^5)$

Then N lines follow, each line contains two integers x,y and a direction, separated by white spaces. These indicate that a player choose the piece located at the y^{th} space of the x^{th} row, and moves it in that direction.

For simplicity, the directions are given in form of abbreviations. **L** represents left. **R** represents right. **UL** represents upper left. **UR** represents upper right. **LL** represents lower left. **LR** represents lower right.

If the player does not have a piece located at the y^{th} space of the x^{th} row, or the piece can never move in the given direction, please skip his/her turn (This player do nothing in his turn). It is guaranteed that the given position and direction are valid.

Output

For each test case, output six lines. The i^{th} line contains twenty integers $x_1, y_1, x_2, y_2, \ldots, x_{10}, y_{10}$ separated by white spaces, indicating the position of the Player i's pieces. The j^{th} piece located at the y_j^{th} space of the x_j^{th} row. The positions should be sorted by x first and then by y in ascending order.

Sample Input

```
12
1 1 LL
16 1 UL
10 1 R
5 11 L
11 10 L
7 1 LR
2 2 LR
13 5 UL
12 2 R
5 12 L
11 11 L
6 1 LR
```

Sample Output

2 1 3 1 3 2 3 3 4 1 4 2 4 3 4 4 5 5 6 9
12 4 14 1 14 2 14 3 14 4 15 1 15 2 15 3 16 2 17 1
10 2 11 1 11 2 12 1 12 3 12 5 13 1 13 2 13 3 13 4
5 7 5 9 5 10 5 13 6 10 6 11 6 12 7 10 7 11 8 10
10 10 11 7 11 9 12 10 12 11 12 12 13 10 13 11 13 12 13 13
5 1 5 2 5 3 5 4 6 2 6 3 7 1 7 2 8 1 11 3