Battleship

Run-time Limit: 1 second
Memory Limit: 32 MB

DESCRIPTION

Battleship is a game where N ($1 < N \leq 5$) players destroy other player's ships. The winner is a player with the highest score at the end of Z ($1 \leq Z \leq 100$) turns, or the last player with an undestroyed ship even if the score is not the highest. Each player has M ($1 \leq M \leq 5$) ships with length L ($0 < L \leq 5$) placed in a board with size A x B ($1 < A,B \leq 100$).

This is the game play of the game:

- To simulate the game, on each turn, a player (starting from player 1) will be given a coordinate (I,J) ($1 \leq I,J \leq 100$) to be destroyed.
- If part of an enemy ship is in that coordinate, the player gets a point.
- If part of player own ship is in that coordinate, the player gets a pinalty point.
- If nothing is in that coordinate, no point will be granted or deducted.
- A ship will be destroyed if and only if all part of the ship is destroyed.
- If a player lose all of his ship, he can't participate in destroying anymore.
- If only one player left, the game stop.

This is the scoring system of the game:

- The point is 10*Y, where Y is the number of part of the ship that is already destroyed.
- The pinalty point is calculated in the same way.

INPUT FORMAT

The first line of input consist of N (total player), M (ship each player has), A, and B (size of the board with A rows and B columns).

For each line for the next M * N lines determine a ship location, the first M lines are the ships location for player 1.

Each line consist of a coordinate (X, Y) ($1 \leq X, Y \leq MIN(A, B)$) denoting the location of the first part of the ship, L (length of the ship), and one of the char [n, s, w, e] (north, south, west, east | the ship direction on the map) to determine the ship location.

For example, 1 1 3 s means that the ship is started from coordinate (1, 1) with length 3 to the south. So, the ship in coordinates [(1,1), (2,1), (3,1)].

The ship is guaranted to be within the boundary.

The next line consist of Z (total number of turns being simulated). For each line for the next Z lines, consist of a coordinate (I, J) where player attack.

OUTPUT FORMAT

If there exist two different ships in the same coordinate, print "ERROR_LOCATION_DETECTED" (without quotes). Otherwise, simulate the game and then print the player's number in each line starting from the winner until the player with the least score. If there is tie with the score, print the player with the smaller number first.

INPUT EXAMPLE

```
2 2 11 11
1 1 3 s
2 2 5 e
5 5 3 n
10 10 3 w
5
10 10
1 1
2 4
6 3
10 8
```

OUTPUT EXAMPLE

```
1
2
```

EXPLANATION

Below is the simulation of the example testcase.

1. Player 1 shots at (10,10).
2. Player 2's ship 2 gets hit at (10,10).
3. Player 2's ship 2 loses 1 of 3 parts.
4. Player 1 gets 10 * 1 point.
5. Player 2 shots at (1,1).
6. Player 1's ship 1 gets hit at (1,1).
7. Player 1's ship 1 loses 1 of 3 parts.
8. Player 2 gets 10 * 1 point.
9. Player 1 shots at (2,4).
10. Player 1's ship 2 gets hit at (2,4).
11. Player 1's ship 2 loses 1 of 5 part.
12. Player 1 loses 10 * 1 point.
13. Player 2 shots at (6,3).
14. Player 2 hits nothing.
15. Player 1 shots at (10,8).
16. Player 2's ship 2 gets hit at (10,8).
17. Player 2's ship 2 loses 2 of 3 parts.
18. Player 1 gets 10 * 2 point.
19. The game ends