Fairy Chess

HackerRank

Let's play *Fairy Chess*!

You have an $n \times n$ chessboard. An s-leaper is a chess piece which can move from some square (x_0, y_0) to some square (x_1, y_1) if $abs(x_0 - x_1) + abs(y_0 - y_1) \leq s$; however, its movements are restricted to *up* ($\uparrow$), *down* ($\downarrow$), *left* ($\leftarrow$), and *right* ($\rightarrow$) within the confines of the chessboard, meaning that diagonal moves are not allowed. In addition, the leaper cannot leap to any square that is occupied by a *pawn*.

Given the layout of the chessboard, can you determine the number of ways a leaper can move m times within the chessboard?

Note: $abs(x)$ refers to the absolute value of some integer, x.

Input Format

The first line contains an integer, q, denoting the number of queries. Each query is described as follows:

1. The first line contains three space-separated integers denoting n, m, and s, respectively.
2. Each line i of the n subsequent lines contains n characters. The j^{th} character in the i^{th} line describes the contents of square (i, j) according to the following key:
   - `.` indicates the location is *empty*.
   - `P` indicates the location is occupied by a *pawn*.
   - `L` indicates the location of the *leaper*.

Constraints

- $1 \leq q \leq 10$
- $1 \leq m \leq 200$
- There will be exactly one `L` character on the chessboard.
- The s-leaper can move *up* ($\uparrow$), *down* ($\downarrow$), *left* ($\leftarrow$), and *right* ($\rightarrow$) within the confines of the chessboard. It *cannot* move diagonally.

Output Format

For each query, print the number of ways the leaper can make m moves on a new line. Because this value can be quite large, your answer must be modulo $10^9 + 7$.

Sample Input 0

```
3
4 1 1
....
.L..
.P..
....
3 2 1
```

```
...
...
..L
4 3 2
....
...L
..P.
P...
```

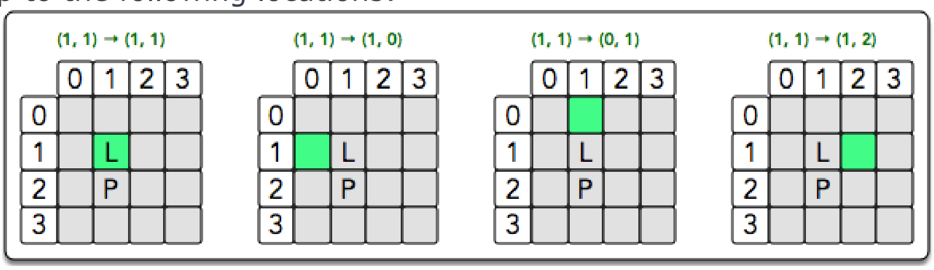
Sample Output 0

```
4
11
385
```

Explanation 0

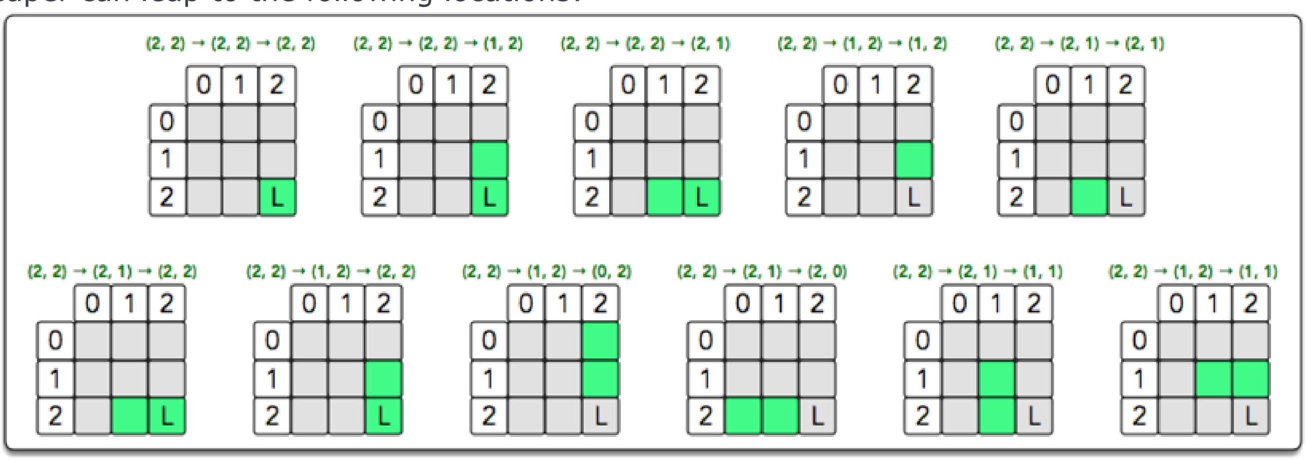
You must perform two queries, outlined below. The *green* cells denote a cell that was leaped to by the leaper, and coordinates are defined as $(row, column)$.

1. The leaper can leap to the following locations:



   Observe that the leaper cannot leap to the square directly underneath it because it's occupied by a pawn. Thus, there are 4 ways to make 1 move and we print 4 on a new line.

2. The leaper can leap to the following locations:



   Thus, we print 11 on a new line.

Note: Don't forget that your answer must be modulo $10^9 + 7$.