C - Domino Effect

Time limit : 5sec / Stack limit : 256MB / Memory limit : 256MB

Question

Takahashi put a domino in each square of a table with R rows and C columns. The characters $s_{i,j}$ are written on the domino in the square at the i_{th} row and the j_{th} column, which is hereinafter referred to as (i,j). Nothing is yet written on dominos where $s_{i,j}$ is `'?'`.

Takahashi checks squares in the table, starting in the first row from the top, moving from left to right, then the second row from the top, moving from left to right, and so on; and if the domino in the square being checked is still standing, he touches it to knock it over.

When the domino in (i,j) with the character `'R'` has fallen over, the domino in $(i,j+1)$ will fall over if the domino will be there and it has not fallen over yet. Similarly, when the domino in (i,j) with the character `'C'` has fallen over, the domino in $(i+1,j)$ will fall over if the domino will be there and it has not fallen over yet.

Consider the following board as an example.

```
RC
RR
```

Takahashi touches and knocks over the domino in $(1,1)$. The domino where the character `'R'` is written fell over, so the domino in $(1,2)$ with the character `'C'` also falls over. The domino where the character `'C'` is written fell over, so the domino in $(2,2)$ with the character `'R'` also falls over. There is no domino in $(2,3)$, so no more dominos fall over. Takahashi then touches and knocks over the domino in $(2,1)$. The domino in $(2,2)$ has already been knocked over, so no more dominos fall over.

When either `'R'` or `'C'` is written with equal probability on all of the dominos with nothing on them, what would the expected value be for the number of dominos Takahashi has to touch to knock over all of the dominos?

Constrains

- $1 \leq R,C, \leq 50$
- $s_{i,j}$ must be either `'R'`, `'C'`, `'?'`.
- There must be at most 10 dominos with nothing written on them.

Input

Inputs are provided from standard inputs in the following form.

$$
\begin{array}{cccc}
R & C & & \\
S_{1,1} & \ldots & S_{1,C} & \\
. & & & \\
. & & & \\
. & & & \\
S_{R,1} & \ldots & S_{R,C} &
\end{array}
$$

Output

Output the expected value for the number of dominos Takahashi has to touch in one line. The answer will be considered correct if its absolute or relative error does not exceed 10^{-9}.

Sample Input 1

```
1 2
??
```

Sample Output 1

```
1.500000000000000
```

When the dominos are `'RR'` or `'RC'`, Takahashi would have to touch one domino, and two dominos when they are `'CR'` or `'CC'`, so the answer is 1.5.

Sample Input 2

```
3 5
?C?RC
C?RRR
????R
```

Sample Output 2

```
5.500000000000000
```