

Contest Duration: 2018-10-13(Sat) 20:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20181013T2100&p1=248>) ~ 2018-10-13(Sat) 22:30 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20181013T2330&p1=248>) (local time) (150 minutes)

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F2 - Reachable Cells

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Time Limit: 9 sec / Memory Limit: 1024 MB

Score : 1500 points

Problem Statement

Problem F and F2 are the same problem, but with different constraints and time limits.

We have a board divided into N horizontal rows and N vertical columns of square cells. The cell at the i -th row from the top and the j -th column from the left is called Cell (i, j) . Each cell is either empty or occupied by an obstacle. Also, each empty cell has a digit written on it. If $A_{i,j} = '1', '2', \dots, \text{or } '9'$, Cell (i, j) is empty and the digit $A_{i,j}$ is written on it. If $A_{i,j} = '#'$, Cell (i, j) is occupied by an obstacle.

Cell Y is *reachable* from cell X when the following conditions are all met:

- Cells X and Y are different.
- Cells X and Y are both empty.
- One can reach from Cell X to Cell Y by repeatedly moving right or down to an adjacent empty cell.

Consider all pairs of cells (X, Y) such that cell Y is reachable from cell X . Find the sum of the products of the digits written on cell X and cell Y for all of those pairs.

Constraints

- $1 \leq N \leq 1500$
- $A_{i,j}$ is one of the following characters: $'1', '2', \dots, '9'$ and $'#'$.

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Input

Input is given from Standard Input in the following format:

```

N
A1,1 A1,2 ... A1,N
A2,1 A2,2 ... A2,N
:
AN,1 AN,2 ... AN,N

```

Output

Print the sum of the products of the digits written on cell X and cell Y for all pairs (X, Y) such that cell Y is reachable from cell X .

Sample Input 1

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```

2
11
11

```

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Sample Output 1

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```

5

```

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There are five pairs of cells (X, Y) such that cell Y is reachable from cell X , as follows:

- $X = (1, 1), Y = (1, 2)$
- $X = (1, 1), Y = (2, 1)$
- $X = (1, 1), Y = (2, 2)$
- $X = (1, 2), Y = (2, 2)$
- $X = (2, 1), Y = (2, 2)$

The product of the digits written on cell X and cell Y is 1 for all of those pairs, so the answer is 5.

Sample Input 2

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```
4
1111
11#1
1#11
1111
```

Sample Output 2

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47

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Sample Input 3

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```
10
76##63##3#
8445669721
75#9542133
3#285##445
749632##89
2458##9515
5952578#77
1#3#44196#
4355#99#1#
#298#63587
```

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Sample Output 3

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36065

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Sample Input 4

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```
10
4177143673
7#####
5#1716155#
6#4#####5#
2#3#597#6#
6#9#8#3#5#
5#2#899#9#
1#6#####6#
6#5359657#
5#####
```

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Sample Output 4

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6525

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