F. Penguin Steps

time limit per test: 3 seconds
memory limit per test: 512 megabytes

Mouf, the clever master of Darkness, and Fouad, the brave champion of Light, have entered the Grid Realm once more. This time, they have found the exit, but it is guarded by fierce monsters! They must fight with their bare hands instead of summoning monsters!

Mouf and Fouad are standing on an $n \times n$ grid. Each cell (i, j) has a value $a_{i,j}$ and a color. The color of a cell is white if $c_{i,j} = 0$ and black if $c_{i,j} = 1$.

Mouf starts at the top-left corner $(1, 1)$, and Fouad starts at the bottom-left corner $(n, 1)$. Both are trying to reach the exit cell at (r, n).

A path is defined as a sequence of adjacent cells (sharing a horizontal or vertical edge). The cost of a path is the maximum value of $a_{i,j}$ among all cells included in the path (including the first and last cells).

Let:

- dis_M denote the minimum possible cost of a valid path from Mouf's starting position $(1, 1)$ to the exit (r, n);
- dis_F denote the minimum possible cost of a valid path from Fouad's starting position $(n, 1)$ to the exit (r, n).

Before moving, Mouf can perform up to k operations. In each operation, he may select any black cell and increment its value by 1 (possibly choosing the same cell multiple times).

Mouf wants to maximize dis_F while ensuring that his own cost dis_M remains **unchanged** (as if he performed no operations). If Mouf acts optimally, what are the values of dis_M and dis_F?

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \le t \le 10^3$). The description of the test cases follows.

The first line of each test case contains three integers n, r, and k ($2 \le n \le 300$, $1 \le r \le n$, $0 \le k \le 10^6$) — the length of the grid, the row number of the exit cell, and the number of allowed operations.

The i-th of the next n lines contains n integers $a_{i,1}, a_{i,2}, \ldots, a_{i,n}$ ($1 \le a_{ij} \le 10^6$) — the values of the cells in the i-th row.

The i-th of the next n lines contains a binary string c_i of length n — denoting the color of the cells in the i-th row (cell (i, j) is white if $c_{i,j} = 0$ and black if $c_{i,j} = 1$).

It is guaranteed that the sum of n^2 over all test cases does not exceed $9 \cdot 10^4$.

Output

For each test case, output two integers — dis_M and dis_F if Mouf performs the operations optimally.

Examples

input (Copy)

```
4
2 1 30
2 2
1 1
11
01
3 3 5
9 2 2
2 3 2
2 2 2
111
111
```

Codeforces Round 1025 (Div. 2)
Finished
Practice

→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

→ Submit?

Language: GNU G++23 14.2 (64 bit, ms

Choose file: Choose File No file chosen

Submit

→ Last submissions

Submission	Time	Verdict
322064398	May/30/2025 17:14	Accepted
320123070	May/17/2025 19:30	Wrong answer on pretest 3

→ Problem tags

binary search | dfs and similar | flows | graphs | shortest paths | *3000

No tag edit access

→ Contest materials

- Announcement (en)
- Tutorial (en)

```
010
7 3 12
3 3 3 3 5 1 1
9 4 8 3 3 5 5
9 4 8 7 3 3 3
4 4 4 4 9 4 9
4 4 4 4 9 4 9
1 4 4 4 4 4 9
1 1 4 4 9 9 9
1111111
1011111
1011111
1111111
1111101
1110001
0111111
5 3 1419
1219 678 1672 1858 1210
535 732 1316 345 296
1106 3060 507 216 1943
194 2124 47 87 4818
1007 329 1425 284 660
00010
10111
00101
10001
10100
```

output Copy

```
2 2
9 5
3 8
1943 2426
```

input Copy

```
1
8 2 2216
429 589 675 2022 259 452 733 967
1097 2880 256 1894 259 1052 345 692
911 831 513 1243 200 14 854 217
611 882 681 279 54 719 1469 1885
504 2524 1332 17 3113 34 1281 717
498 1896 1800 2231 731 364 69 1247
1397 399 68 448 1337 1076 166 3786
16 857 91 475 106 102 1517 1949
01010100
00101100
00001000
10100110
00001000
00100000
01100011
00001000
```

output Copy

```
733 1671
```

Note

In the first test case:

- Although Mouf can perform up to 30 operations, he can not increase dis_F beyond 2; he is restricted to applying operations only on $(2, 2)$, because performing operations on $(1, 1)$ or $(1, 2)$ would change dis_M.
- Mouf may apply all 30 operations on cell $(2, 2)$; however, Fouad can still follow the path $(2, 1) \to (1, 1) \to (1, 2)$ with a cost of 2.

In the second test case, Mouf can apply two operations on $(2, 2)$ and three operations on $(3, 2)$. It can be shown that Mouf can not increase dis_F beyond 5.