



THE 2024 ICPC ASIA PACIFIC CHAMPIONSHIP

VNU UNIVERSITY OF ENGINEERING AND TECHNOLOGY

2ND MARCH 2024



Problem G Personality Test Time limit: 3 seconds

There are n students taking a personality test consisting of m questions. The students are numbered from 1 to n and the questions are numbered from 1 to m . For each question, each student can either answer it with a single uppercase Latin character (A–Z) or not answer it. Let S_i be a string of m characters representing the answers of student i , where the j -th character of S_i is an uppercase Latin character if they answered question j , or a period (.) if they did not.

Two students are considered *similar* if there is a set of at least k questions where both students answered all questions in the set, and for each question in the set, they answered it with the same answer.

For example, let $n = 3$, $m = 3$, $k = 2$, $S_1 = \text{BBC}$, $S_2 = \text{. . C}$, and $S_3 = \text{. BC}$. In this example, students 1 and 3 are similar since they answered questions 2 and 3 with the same answer, while students 2 and 3 are not similar since they answered only question 3 with the same answer.

You want to find a pair of integers (a, b) such that $a < b$ and students a and b are similar, or determine if there is no such pair. If there is more than one pair, find the one with the **smallest** b . If there is still more than one pair, find the one with the **largest** a .

Input

The first line of input contains three integers n , m , and k ($2 \leq n \leq 5000$; $1 \leq m \leq 3000$; $1 \leq k \leq 5$). Each of the next n lines contains a string of m characters. The i -th line contains the string S_i .

Output

Output one line containing the integers a and b representing the pair of similar students as mentioned in the problem statement, or just the integer -1 if there is no such pair.

Sample Input #1

```
3 3 2
BBC
. . C
. BC
```

Sample Output #1

```
1 3
```

Explanation for the sample input/output #1

This is the example in the problem statement.



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Sample Input #2

```
3 3 1
BBC
.C
.BC
```

Sample Output #2

```
1 2
```

Explanation for the sample input/output #2

Students 1 and 2 are similar.

Sample Input #3

```
3 3 3
BBC
.C
.BC
```

Sample Output #3

```
-1
```

Explanation for the sample input/output #3

There is no pair of similar students.

Sample Input #4

```
4 12 2
GOOD.LUCK.IN
WINNING.ICPC
ASIA.PACIFIC
CHAMPIONSHIP
```

Sample Output #4

```
2 3
```