

# Task: ROZ

## Diversity



XXV OI, Stage I. Source file roz.\* Available memory: 512 MB.

16.10–13.11.2017

A two-dimensional array of integers  $A$  is given, consisting of  $m$  rows and  $n$  columns. The subarrays of dimension  $k \times k$  of array  $A$  are called its  $k$ -fragments.

The *diversity* of a  $k$ -fragment is the number of its distinct elements. Your task is to calculate the maximum diversity of all  $k$ -fragments of  $A$ , as well as the sum of diversities of all  $k$ -fragments of  $A$ .

## Input

The first line of the standard input contains three positive integers  $m, n, k$  ( $k \leq \min(m, n)$ ), which specify the dimensions of the array  $A$  and of the square subarray (fragment).

The  $m$  lines that follow contain  $n$  integers each, listing the contents of array  $A$ . All these numbers are in the range  $[1, C]$ , and are separated by single spaces within each row.

## Output

Two integers, separated by a single space, should be printed to the standard output: the maximum diversity of all  $k$ -fragments of  $A$  and the sum of diversities of all  $k$ -fragments of  $A$ .

## Example

For the input data:

```
3 5 2
1 5 3 3 3
4 1 3 3 4
4 2 4 4 3
```

the correct result is:

```
4 20
```

**Explanation for the example:** Successive 2-fragments (from left to right) starting in the topmost row have diversities 3, 3, 1, and 2, whereas the 2-fragments starting in the row beneath have diversities 3, 4, 2, and 2.

### Sample grading tests:

**1ocen:**  $m = 3, n = 3, k = 2$ , a small correctness test;

**2ocen:**  $m = 20, n = 100, k = 10$ , every number in the array is the sum of its row and column numbers;

**3ocen:**  $m = 1000, n = k = 1$ , all the numbers in the array are the same;

**4ocen:**  $m = n = k = 200$ , all the numbers in the array are unique;

**5ocen:**  $m = n = 3000, k = 1000$ , every number in the array is the sum of its row and column numbers.

## Grading

The set of tests consists of the following subsets. Within each subset, there may be several unit tests.

If your program prints two numbers such that only one of them is correct, you will receive half the points for the given test. In such case, the other number should fit in one of the standard integer types.

Subset	Bounds on $m, n, k$	Bound on $C$	Score
1	$m, n, k \leq 100$	$C \leq 10^5$	10
2	$m, n, k \leq 600$	$C \leq 100$	10
3	$m, n, k \leq 600$	$C \leq 10^5$	20
4	$n, k \leq 3000, m \leq 2k$	$C \leq 10^5$	45
5	$m, n, k \leq 3000$	$C \leq 10^5$	15