



# Counting Special Sub-Cubes

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Problem

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Given an  $n \times n \times n$  cube, let  $f(x, y, z)$  (where  $1 \leq x, y, z \leq n$ ) denote the value stored in cell  $(x, y, z)$ .

A  $k \times k \times k$  sub-cube (where  $1 \leq k \leq n$ ) of an  $n \times n \times n$  cube is considered to be *special* if the maximum value stored in any cell in the sub-cube is equal to  $k$ .

For each  $k$  in the inclusive range  $[1, n]$ , calculate the number of special sub-cubes. Then print each  $count_k$  as a single line of space-separated integers (i.e.,  $count_1 \ count_2 \ \dots \ count_n$ ).

## Input Format

The first line contains an integer,  $q$ , denoting the number of queries. The  $2 \cdot q$  subsequent lines describe each query over two lines:

1. The first line contains an integer,  $n$ , denoting the side length of the initial cube.
2. The second line contains  $n^3$  space-separated integers describing an array of  $n^3$  integers in the form  $a_0, a_1, \dots, a_{n^3-1}$ . The integer in some cell  $(x, y, z)$  is calculated using the formula  $a[(x-1) \cdot n^2 + (y-1) \cdot n + z]$ .

## Constraints

- $1 \leq q \leq 5$
- $1 \leq n \leq 50$
- $1 \leq f(x, y, z) \leq n$  where  $1 \leq x, y, z \leq n$

## Output Format

For each query, print  $n$  space-separated integers where the  $i^{th}$  integer denotes the number of special sub-cubes for  $k = i$ .

## Sample Input

```
2
2
2 1 1 1 1 1 1 1
2
1 1 1 1 2 1 1 2
```

## Sample Output

```
7 1
6 1
```

## Explanation

We must perform the following  $q = 2$  queries:

1. We have a cube of size  $n = 2$  and must calculate the number of special sub-cubes for the following values of  $k$ :
  - $k = 1$ : There are  $2^3 = 8$  sub-cubes of size 1 and seven of them have a maximum value of 1 written inside them. So, for  $k = 1$ , the answer is 7.

- $k = 2$ : There is only one sub-cube of size  $2$  and the maximum number written inside it is  $2$ . So, for  $k = 2$ , the answer is  $1$ .

We then print the respective values for each  $k$  as a single line of space-separated integers (i.e.,  $7\ 1$ ).

2. We have a cube of size  $n = 2$  and must calculate the number of special sub-cubes for the following values of  $k$ :

- $k = 1$ : There are  $2^3 = 8$  sub-cubes of size  $1$  and six of them have a maximum value of  $1$  written inside them. So, for  $k = 1$ , the answer is  $6$ .
- $k = 2$ : There is only one sub-cube of size  $2$  and the maximum number written inside it is  $2$ . So, for  $k = 2$ , the answer is  $1$ .

We then print the respective values for each  $k$  as a single line of space-separated integers (i.e.,  $6\ 1$ ).

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Max Score: 50


Difficulty: Medium

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Java 7  

```
1 import java.io.*;
2 import java.util.*;
3 import java.text.*;
4 import java.math.*;
5 import java.util.regex.*;
6
7 public class Solution {
8     public static void main(String args[] ) throws Exception {
9         /* Enter your code here. Read input from STDIN. Print output to STDOUT */
10    }
11 }
12
```

Line: 1 Col: 1

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