

## Kick Start 2015 - Round C

# gMatrix

### Problem

You have a square **N** by **N** matrix **M** of nonnegative integers. We would like to make a list of the maximum values in every sub-matrix of size **K** by **K** within **M**, and then find the sum of those values together. (Note that the same entry of **M** might be the maximum value in more than one sub-matrix, in which case it will show up multiple times in the list.) Can you find that sum?

To simplify the input of the matrix, you are given two arrays **A** and **B** of length **N**, and two integers **C** and **X**. Then the entry  $M_{ij}$  (for the *i*th row and *j*th column of the matrix) equals  $(A_i * i + B_j * j + C) \bmod X$ , where *i* and *j* are in the range  $[1, N]$ .

### Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with one line with four integers, **N**, **K**, **C** and **X**. Then there are two lines with **N** integers each, representing the arrays **A** and **B**.

### Output

For each test case, output one line containing "Case #x: y", where *x* is the test case number (starting from 1) and *y* is the sum of the maximum values in all sub-matrices of size **K** by **K**.

### Limits

Memory limit: 1 GB.  
 $1 \leq T \leq 100$ .  
 $1 \leq A_i, B_i \leq 100000$ .  
 $1 \leq C \leq 100000$ .  
 $1 \leq X \leq 1000000007$ .  
 $1 \leq K \leq N$ .

#### Small dataset (Test Set 1 - Visible)

Time limit: 30 seconds.  
 $1 \leq N \leq 50$ .

#### Large dataset (Test Set 2 - Hidden)

Time limit: 90 seconds.  
 $1 \leq N \leq 3000$ .

### Sample

#### Sample Input

```
3
1 1 1 5
```

#### Sample Output

```
Case #1: 3
Case #2: 19
```

```
1
1
2 1 5 11
1 2
3 4
3 2 3 109
6 4 3
2 1 5
```

Case #3: 80

In the first test case, the matrix is:

3

So the sum of maximum values is 3.

In the second test case, the matrix is:

9 3

1 6

So the sum of maximum values is 19.

In the third test case, the matrix is:

11 11 24

13 13 26

14 14 27