

## E. Photoshoot for Gorillas

time limit per test: 2 seconds

memory limit per test: 256 megabytes

You really love gorillas, so you decided to organize a photoshoot for them. Gorillas live in the jungle. The jungle is represented as a grid of  $n$  rows and  $m$  columns.  $w$  gorillas agreed to participate in the photoshoot, and the gorilla with index  $i$  ( $1 \leq i \leq w$ ) has a *height* of  $a_i$ . You want to place **all** the gorillas in the cells of the grid such that there is **no more than one gorilla** in each cell.

The *spectacle* of the arrangement is equal to the sum of the *spectacles* of all sub-squares of the grid with a side length of  $k$ .

The *spectacle* of a sub-square is equal to the sum of the *heights* of the gorillas in it.

From all suitable arrangements, choose the arrangement with the **maximum spectacle**.

### Input

The first line contains an integer  $t$  ( $1 \leq t \leq 10^3$ ) — the number of test cases.

The descriptions of the test cases follow.

The first line contains integers  $n, m, k$  ( $1 \leq n, m \leq 2 \cdot 10^5$ ,  $1 \leq n \cdot m \leq 2 \cdot 10^5$ ,  $1 \leq k \leq \min(n, m)$ ) — the dimensions of the grid and the side length of the square.

The second line contains an integer  $w$  ( $1 \leq w \leq n \cdot m$ ) — the number of gorillas.

The third line contains  $w$  integers  $a_1, a_2, \dots, a_w$  ( $1 \leq a_i \leq 10^9$ ) — the *heights* of the gorillas.

It is guaranteed that the sum of  $n \cdot m$  across all test cases does not exceed  $2 \cdot 10^5$ . The same guarantee applies to  $w$ .

### Output

For each test case, output a single integer — the **maximum spectacle** of a suitable arrangement.

### Example

input

Copy

```
5
3 4 2
9
1 1 1 1 1 1 1 1
2 1 1
2
5 7
20 15 7
9
4 1 4 5 6 1 1000000000 898 777
1984 1 1
4
5 4 1499 2004
9 5 5
6
6 7 14 16 16 6
```

output

Copy

```
21
12
4900083104
3512
319
```

### Codeforces Round 966 (Div. 3)

Finished

Practice



### → Virtual participation



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### → Problem tags

[combinatorics](#) [data structures](#) [greedy](#)  
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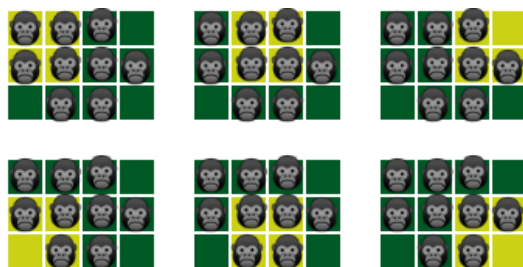
No tag edit access

### → Contest materials

- Announcement 
- Video Tutorial (en) 

**Note**

In the first test case of the first input set, the *spectacle* of the following sub-squares is summed:



Yellow color corresponds to the sub-squares, green — to the rest of the grid squares.

The picture shows the optimal arrangement of the gorillas. The *spectacle* of the arrangement is  $4 + 4 + 3 + 3 + 4 + 3 = 21$ .

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