Max Mex | Problem Code: MEX

All submissions for this problem are available.

Read problems statements in mandarin chinese, russian and vietnamese as well.

You are given a multi-set **S** of **N** integers, and an integer **K**. You want to find the maximum value of minimal excluded non-negative integer (**MEX**) of the multi-set given that you are allowed to add at most any **K** integers to the multi-set. Find the maximum value of MEX that you can obtain.

Few examples of finding MEX of a multi-set are as follows. MEX of multi-set {0} is 1, {1} is 0, {0, 1, 3} is 2, {0, 1, 2, 3, 5, 6} is 4.

Input

The first line of the input contains an integer **T** denoting the number of testcases.

The first line of each test case contains two space seperated integers **N** and **K** denoting the size of the multi-set and the maximum number of extra integers that you can add in the multi-set respectively.

The second line contains **N** space separated integers denoting the multi-set **S**: S_1, S_2 ,.... S_N.

Output

For each testcase, output the answer in a single line.

Constraints

- $1 \le T \le 10$
- $1 \le N \le 10^5$
- $0 \le K \le 10^5$
- $0 \le S_i \le 2 * 10^5$

Subtasks

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Example

```
Input:
4
3 0
1 0 2
3 1
1 0 2
4 3
2 5 4 9
2 0
3 4

Output:
3
4
6
0
```

Explanation

Example case 1. As **K** = 0, so we can't add any element to the multi-set. Elements of the set are {1, 0, 2}. The MEX value of this set is 3.

Example case 2. As **K** = 1, you are allowed to add at most 1 element to the multi-set. The multi-set are {1, 0, 2}. You can add element 3 to the multi-set, and it becomes {1, 0, 2, 3}. The MEX value of this multi-set is 4. There is no other way to have higher value of MEX of the set by adding at most one element to the multi-set.

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Editorial:	https://discuss.codechef.com/problems/MEX
Tags:	greedy, hruday968, oct17, simple, sorting
Date Added:	22-08-2017
Time Limit:	1 secs
Source Limit:	50000 Bytes
Languages:	C, CPP14, JAVA, PYTH, PYTH 3.5, PYPY, CS2, PAS fpc, PAS gpc, RUBY, PHP, GO, NODEJS, HASK, SCALA, D, PERL, FORT, WSPC, ADA, CAML, ICK, BF, ASM, CLPS, PRLG, ICON, SCM qobi, PIKE, ST, NICE, LUA, BASH, NEM, LISP sbcl, LISP clisp, SCM guile, JS, ERL, TCL, PERL6, TEXT, SCM chicken, CLOJ, FS

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- Problem Setting
- CodeChef Tutorials
- CodeChef Wiki

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- Medium
- Hard
- Challenge
- Peer
- School
- FAQ's

Initiatives

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