6732   Arrows and Quiver

Arjuna has a test in archery from his guru, Dronacharya. He carries with him a bag full of N arrows, each arrow of a specific (distinct) kind. The test is designed as a sequence of M targets. Each target can be hit by only a specific kind of arrow. It is a common practice to hold a small number of arrows in quiver on one's back because it saves you from the trouble of carrying a big bag of arrows with you everywhere. Every quiver has a fixed capacity.

Being such an amazing archer, he takes no time to fire an arrow from his quiver and hit his target. He also takes no time to retrieve his arrow from the target for use in possible future targets. But his quiver size is not very large. And since his bag of arrows is so large, he incurs a cost of 1 time unit whenever he needs to search his bag and load the respective arrow into his quiver.

He uses the following scheme for filling his quiver. Initially, it is empty.

a) If the arrow required to shoot is present in the quiver, then his firing is instant. After firing the arrow, he obviously gets it back and puts it in his quiver, all this in no time.

b) If the arrow required to shoot is not present in the quiver, he takes one time unit to find it, shoot it, and put it back in the quiver.

c) If his quiver cannot hold the arrow (i.e., the quiver is full to its maximum capacity), he takes the least recently used arrow and shoves it back into his bag instantly; and then places the arrow that he just shot in the quiver.

Now, he needs to get done with this test quickly. In particular, he has a time limit of C before which he has to go meet his lover, Subhadra. Given that he has N arrows and M targets (which he has to fire in order), find the minimum capacity of the quiver S needed in order to finish his test by time C.

Since Dronacharya does not approve of his love, it might be impossible for him to finish in time. In which case, output '-1'.

Input

The first line contains T, the number of test cases. The description of T test cases follow. The first line of each test case contains 3 space separated integers N, M and C denoting the total number of arrows, the count of targets that Arjuna has to fire at and the maximum total time he can afford to spend on the test respectively. The next line of each test case contains M space separated integers (each between 1 and N), denoting the order of arrows which he needs to fire at the targets.

Output

For each test case, output a single integer denoting the minimum quiver size S, such that the total time to finish the test doesn't exceed C. If it is not possible to finish in time, output '-1'.

Constraints:
$1 \leq N, M \leq 10^5$
$1 \leq C \leq M$

Sample Input

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3
5 8 5
1 2 3 4 5 3 4 5
3 3 1
1 1 2
4 5 2
1 2 1 2 1
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Sample Output

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3
-1
2
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