

Hotel Arrangement

Assume that you are running a hotel with N ($2 \leq N \leq 100,000$) rooms. All the rooms in the hotel are located along a straight line at positions x_1, \dots, x_N . One day there came C ($2 \leq C \leq N$) aggressive customers. To prevent them from fighting each other, you would like to assign them to C rooms individually, such that the minimum distance between any two of them is as large as possible. What is the largest minimum distance?

It is guaranteed that any two rooms will not be located at the same position.

Input

The input consists of multiple test cases. The first line of the input contains an integer T ($1 \leq T \leq 10$) indicating the number of test cases. For each test case, the first line contains two integers N and C , separated by a space. In the following N lines, the i -th line contains an integer x_i , indicating the location of the i -th room ($0 \leq x_i \leq 1,000,000,000$).

Output:

For each test case, output one integer indicating the largest minimum distance in a separate line.

Sample Input	Sample Output
2 5 3 1 2 8 4 9 2 2 7 3	3 4

Hints: binary search

Explanation:

In the first example, one solution is to arrange 3 customers in the rooms at positions $\{1, 4, 8\}$, resulting in a minimum distance of 3. Another solution is $\{1, 4, 9\}$. Both solutions give the largest minimum distance 3.