Problem F. Quiz Master

Time limit 2000 ms
Mem limit 262144 kB

A school has to decide on its team for an international quiz. There are n students in the school. We can describe the students using an array a where a_i is the smartness of the i-th ($1 \leq i \leq n$) student.

There are m topics $1, 2, 3, \ldots, m$ from which the quiz questions will be formed. The i-th student is considered proficient in a topic T if $(a_i \bmod T) = 0$. Otherwise, he is a rookie in that topic.

We say that a team of students is collectively proficient in all the topics if for every topic there is a member of the team proficient in this topic.

Find a team that is collectively proficient in all the topics such that the maximum difference between the smartness of any two students in that team is **minimized**. Output this difference.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10^4$). The description of the test cases follows.

The first line of each test case contains n and m ($1 \leq n, m \leq 10^5$).

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($1 \leq a_i \leq 10^5$).

It is guaranteed that the sum of n over all test cases does not exceed 10^5.

It is guaranteed that the sum of m over all test cases does not exceed 10^5.

Output

For each test case, print the answer on a new line. If there is no solution, output -1.

Sample 1

Input	Output
3 2 4 3 7 4 2 3 7 2 9 5 7 6 4 3 5 7	-1 0 3

Note

In the first test case, we have participants with smartnesses 3 and 7, and $m = 4$. Thus, there is no student with smartness divisible by 2. Since $2 \leq m$, there is no way to choose a team.

In the second test case, we can select the participant with smartness 2 to be the only one on the team. This way the team will be collectively proficient in both topics 1 and 2.

In the third test case, consider the team with participants of smartnesses $4, 5, 6, 7$. This way the team will be collectively proficient in all topics $1, 2, \ldots, 7$.