Promoting Diversity

You are appointed as the Head of HR for A Prominent Powerfull Legendary Enterprise (A.P.P.L.E.). The organisation is charged with diversity lawsuits, and you have to prove it to the court that your organisation has "great" diversity. Good that you also have a B.Tech. in Computer Science proving this is childs play for you

You are given a list of N entries, and an integer D denoting the minimum diversity needed in your organisation.

You have to find the least possible p such that every subsequence of size exactly p has a diversity at least D

The diversity of any subsequence S is defined as follows:

$$\text{Diversity}(S) = max(|S[i] - S[j]|) \ \ \forall 1 \leq i \leq j \leq |S|$$

Note: A subsequence is a sequence that can be derived from the given sequence by deleting zero or more elements without changing the order of the remaining elements.

Note: p is guaranteed to exist, $p \leq 10^{18}$

Note: p need not be a factor of N

Input Format

The first line contains the number of test cases, T

Each test case comprises of 2 lines as follows:

The first line of each test case contains N and D seperated by a space

The second line of each test case has N space seperated integers denoting the N elements of the list.

Constraints

20 points:

$$1 \leq T \leq 10$$
$$1 \leq p \leq n \leq 10$$
$$1 \leq D \leq 10^6$$
$$A[i] \leq 10^6$$

30 points:

$$1 \leq T \leq 10$$
$$1 \leq p \leq n \leq 20$$
$$1 \leq D \leq 10^9$$
$$A[i] \leq 10^9$$

30 points:

$$1 \leq T \leq 10$$
$$1 \leq p \leq n \leq 1000$$
$$1 \leq D \leq 10^9$$
$$A[i] \leq 10^9$$

20 points:

$$1 \leq T \leq 3$$
$$1 \leq p \leq n \leq 10^6$$
$$1 \leq D \leq 10^{18}$$
$$A[i] \leq 10^{18}$$

Output Format

For each test case, output p corresponding to that test case on a new line

Sample Input 0

```
1
5 2
4 3 1 5 6
```

Sample Output 0

```
3
```

Explanation 0

$p = 1$ subsequences are trivial as all of them will have diversity 0.

Consider all the $p = 2$ subsequences i.e. $\{4,3\}, \{4,1\}, \{4,5\}, \{4,6\}, \{3,1\}, \{3,5\}, \{3,6\}, \{1,5\}, \{1,6\}, \{5,6\}$. They have diversities as $1, 3, 1, 2, 2, 2, 3, 4, 5, 1$, respectively. Clearly not all of them have diversity greater than $D = 2$. Hence $p = 2$ is not possible.

Try the same thing, with all subsequences of size $p = 3$ you will find that the minimum diversity among them is 3 which is greater than $D = 2$.

Hence $p = 3$ is the answer.

Submissions: 178
Max Score: 100
Difficulty: Medium

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Current Buffer (saved locally, editable) C++

```
#include <cmath>
#include <cstdio>
#include <vector>
#include <iostream>
#include <algorithm>
using namespace std;


int main() {
    /* Enter your code here. Read input from STDIN. Print output to STDOUT */
    return 0;
}
```

Line: 1 Col: 1

Upload Code as File Test against custom input Run Code Submit Code