CODER'S CUP 2018 – FRESHMEN ROUND QUALIFIER B

QUESTION # 1:

Water the Garden

It is winter now, and Saad decided it's about time he watered the garden.

The garden can be represented as n consecutive garden beds, numbered from 1 to n. k beds contain water taps (i-th tap is located in the bed xi), which, if turned on, start delivering water to neighboring beds. If the tap on the bed xi is turned on, then after one second has passed, the bed xi will be watered; after two seconds have passed, the beds from the segment [xi - 1, xi + 1] will be watered (if they exist); after j seconds have passed **(j is an integer number)**, the beds from the segment [xi - (j - 1), xi + (j - 1)] will be watered (if they exist). **Nothing changes during the seconds, so, for example, we can't say that the segment [xi - 2.5, xi + 2.5] will be watered after 2.5seconds have passed; only the segment [xi - 2, xi + 2] will be watered at that moment**.

Saad wants to **turn on all the water taps at the same moment**, and now he wonders, what is the minimum number of seconds that have to pass after he turns on some taps until the whole garden is watered. Help him to find the answer!

Input Format

The first line contains one integer t — the number of test cases to solve ($1 \le t \le 200$).

Then t test cases follow. The first line of each test case contains two integers n and k ($1 \le n \le 200$, $1 \le k \le n$) — the number of garden beds and water taps, respectively.

Next line contains k integers xi ($1 \le xi \le n$) — the location of i-th water tap. It is guaranteed that for each $i \in [2; k]$ condition xi - 1 < xi holds.

It is guaranteed that the sum of n over all test cases doesn't exceed 200.

Output Format

For each test case print one integer — the minimum number of seconds that have to pass after Saad turns on some of the water taps, until the whole garden is watered.

Examples

Input

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

Output

3
1
4

Explanation:

The first example consists of 3 tests:

1. There are 5 garden beds, and a water tap in the bed 3. If we turn it on, then after 1 second passes, only bed 3 will be watered; after 2seconds pass, beds $[1, 3]$ will be watered, and after 3 seconds pass, everything will be watered.
2. There are 3 garden beds, and there is a water tap in each one. If we turn all of them on, then everything will be watered after 1 second passes.
3. There are 4 garden beds, and only one tap in the bed 1. It will take 4 seconds to water, for example, bed 4.

QUESTION # 2:

Shakeeb and the Ringroad

Shakeeb lives in a city that has n houses built along the main ringroad. The ringroad houses are numbered 1 through n in the clockwise order. The ringroad traffic is one way and also is clockwise.

Shakeeb has recently moved into the ringroad house number 1. As a result, he's got m things to do. In order to complete the i-th task, he needs to be in the house number ai and complete all tasks with numbers less than i. Initially, Shakeeb is in the house number 1, find the minimum time he needs to complete all his tasks if moving from a house to a neighboring one along the ringroad takes one unit of time.

Input Format

The first line contains two integers n and m ($2 \le n \le 10^5$, $1 \le m \le 10^5$). The second line contains m integers a1, a2, ..., am ($1 \le ai \le n$). Note that Shakeeb can have multiple consecutive tasks in one house.

Output Format

Print a single integer — the time Shakeeb needs to complete all tasks.

Examples

Input

4 3

3 2 3

Output

6

Input

4 3

2 3 3

Output

2

QUESTION # 3:

Sauban and the Valid String

Sauban considers a string to be *valid* if all characters of the string appear the same number of times. It is also *valid* if he can remove just 1 character at 1 index in the string, and the remaining characters will occur the same number of times. Given a string s, determine if it is *valid*. If so, return YES, otherwise return NO.

For example, if s = abc, it is a valid string because frequencies are {a:1, b:1, c:1}. So is s = abcc because we can remove one c and have 1 of each character in the remaining string. If s = abccc however, the string is not *valid* as we can only remove 1 occurrence of c. That would leave character frequencies of {a:1, b:1, c:2}.

Input Format

A single string s.

Constraints

- $1 \leq |s| \leq 10^5$
- Each character s[i] belongs to ascii[a-z]

Output Format

Print YES if string s is *valid*, otherwise, print NO.

Examples

Input

aabbcd

Output

NO

Input

aabbccddeefghi

Output

NO

Input

abcdefghhgfedecba

Output

YES

QUESTION # 4:

Walking Between the Houses

There are n houses in a row. They are numbered from 1 to n in order from left to right. Initially you are in the house 1.

You have to perform k moves to other house. In one move you go from your current house to some other house. You can't stay where you are (i.e., in each move the new house differs from the current house). If you go from the house xx to the house y, the total distance you walked increases by $|x-y|$ units of distance, where $|a|$ is the absolute value of a. It is possible to visit the same house multiple times (but you can't visit the same house in sequence).

Your goal is to walk exactly s units of distance in total.

If it is impossible, print "NO". Otherwise print "YES" and any of the ways to do that. Remember that you should do exactly k moves.

Input Format

The first line of the input contains three integers n, k, s ($2 \le n \le 10^9$, $1 \le k \le 2 \cdot 10^5$, $1 \le s \le 10^{18}$) — the number of houses, the number of moves and the total distance you want to walk.

Output Format

If you cannot perform k moves with total walking distance equal to s, print "NO".

Otherwise print "YES" on the first line and then print exactly k integers hi ($1 \le hi \le n$) on the second line, where hi is the house you visit on the i-th move.

For each j from 1 to $k-1$ the following condition should be satisfied: $hj \ne hj+1$. Also, $h1 \ne 1$ should be satisfied.

Examples

Input

10 2 15

Output

YES
10 4

Input

10 9 45

Output

YES
10 1 10 1 2 1 2 1 6

Input

10 9 81

Output

YES
10 1 10 1 10 1 10 1 10