Codeforces Sponsored by Telegram

Codeforces Round #464 (Div. 2)

A. Love Triangle

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

As you could know there are no male planes nor female planes. However, each plane on Earth likes some other plane. There are n planes on Earth, numbered from 1 to n, and the plane with number i likes the plane with number f_i, where $1 \le f_i \le n$ and $f_i \ne i$.

We call a love triangle a situation in which plane A likes plane B, plane B likes plane C and plane C likes plane A. Find out if there is any love triangle on Earth.

Input

The first line contains a single integer n $(2 \le n \le 5000)$ — the number of planes.

The second line contains n integers $f_1, f_2, ..., f_n$ $(1 \le f_i \le n, f_i \ne i)$, meaning that the i-th plane likes the f_i-th.

Output

Output «YES» if there is a love triangle consisting of planes on Earth. Otherwise, output «NO».

You can output any letter in lower case or in upper case.

Examples

input

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

output

```
YES
```

input

```
5
5 5 5 5 1
```

output

```
NO
```

Note

In first example plane 2 likes plane 4, plane 4 likes plane 1, plane 1 likes plane 2 and that is a love triangle.

In second example there are no love triangles.

B. Hamster Farm

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Dima has a hamsters farm. Soon N hamsters will grow up on it and Dima will sell them in a city nearby.

Hamsters should be transported in boxes. If some box is not completely full, the hamsters in it are bored, that's why each box should be completely full with hamsters.

Dima can buy boxes at a factory. The factory produces boxes of K kinds, boxes of the i-th kind can contain in themselves a_i hamsters. Dima can buy any amount of boxes, but he should buy boxes of only one kind to get a wholesale discount.

Of course, Dima would buy boxes in such a way that each box can be completely filled with hamsters and transported to the city. If there is no place for some hamsters, Dima will leave them on the farm.

Find out how many boxes and of which type should Dima buy to transport maximum number of hamsters.

Input

The first line contains two integers N and K ($0 \le N \le 10^{18}$, $1 \le K \le 10^5$) — the number of hamsters that will grow up on Dima's farm and the number of types of boxes that the factory produces.

The second line contains K integers a_1, a_2, ..., a_K ($1 \le a_i \le 10^{18}$ for all i) — the capacities of boxes.

Output

Output two integers: the type of boxes that Dima should buy and the number of boxes of that type Dima should buy. Types of boxes are numbered from 1 to K in the order they are given in input.

If there are many correct answers, output any of them.

Examples

input

```
19 3
5 4 10
```

output

```
2 4
```

input

```
28 3
5 6 30
```

output

```
1 5
```

C. Convenient For Everybody

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

In distant future on Earth day lasts for n hours and that's why there are n timezones. Local times in adjacent timezones differ by one hour. For describing local time, hours numbers from 1 to n are used, i.e. there is no time "0 hours", instead of it "n hours" is used. When local time in the 1-st timezone is 1 hour, local time in the i-th timezone is i hours.

Some online programming contests platform wants to conduct a contest that lasts for an hour in such a way that its beginning coincides with beginning of some hour (in all time zones). The platform knows, that there are a_i people from i-th timezone who want to participate in the contest. Each person will participate if and only if the contest starts no earlier than s hours 00 minutes local time and ends not later than f hours 00 minutes local time. Values s and f are equal for all time zones. If the contest starts at f hours 00 minutes local time, the person won't participate in it.

Help platform select such an hour, that the number of people who will participate in the contest is maximum.

Input

The first line contains a single integer n ($2 \leq n \leq 100\,000$) — the number of hours in day.

The second line contains n space-separated integers $a_1, a_2, ..., a_n$ ($1 \leq a_i \leq 10\,000$), where a_i is the number of people in the i-th timezone who want to participate in the contest.

The third line contains two space-separated integers s and f ($1 \leq s < f \leq n$).

Output

Output a single integer — the time of the beginning of the contest (in the first timezone local time), such that the number of participants will be maximum possible. If there are many answers, output the smallest among them.

Examples

input

```
3
1 2 3
1 3
```

output

```
3
```

input

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

output

```
4
```

Note

In the first example, it's optimal to start competition at 3 hours (in first timezone). In this case, it will be 1 hour in the second timezone and 2 hours in the third timezone. Only one person from the first timezone won't participate.

In second example only people from the third and the fourth timezones will participate.

D. Love Rescue

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Valya and Tolya are an ideal pair, but they quarrel sometimes. Recently, Valya took offense at her boyfriend because he came to her in t-shirt with lettering that differs from lettering on her pullover. Now she doesn't want to see him and Tolya is seating at his room and crying at her photos all day long.

This story could be very sad but fairy godmother (Tolya's grandmother) decided to help them and restore their relationship. She secretly took Tolya's t-shirt and Valya's pullover and wants to make the letterings on them same. In order to do this, for one unit of mana she can buy a spell that can change some letters on the clothes. Your task is calculate the minimum amount of mana that Tolya's grandmother should spend to rescue love of Tolya and Valya.

More formally, letterings on Tolya's t-shirt and Valya's pullover are two strings with same length n consisting only of lowercase English letters. Using one unit of mana, grandmother can buy a spell of form (c_1, c_2) (where c_1 and c_2 are some lowercase English letters), which can arbitrary number of times transform a single letter c_1 to c_2 and vise-versa on both Tolya's t-shirt and Valya's pullover. You should find the minimum amount of mana that grandmother should spend to buy a set of spells that can make the letterings equal. In addition you should output the required set of spells.

Input

The first line contains a single integer n $(1 \le n \le 10^5)$ — the length of the letterings.

The second line contains a string with length n, consisting of lowercase English letters — the lettering on Valya's pullover.

The third line contains the lettering on Tolya's t-shirt in the same format.

Output

In the first line output a single integer — the minimum amount of mana t required for rescuing love of Valya and Tolya.

In the next t lines output pairs of space-separated lowercase English letters — spells that Tolya's grandmother should buy. Spells and letters in spells can be printed in any order.

If there are many optimal answers, output any.

Examples

input

```
3
abb
dad
```

output

```
2
a d
b a
```

input

```
8
drpepper
cocacola
```

output

```
7
l e
e d
d c
c p
p o
o r
r a
```

Note

In first example it's enough to buy two spells: ('a','d') and ('b','a'). Then first letters will coincide when we will replace letter 'a' with 'd'. Second letters will coincide when we will replace 'b' with 'a'. Third letters will coincide when we will at first replace 'b' with 'a' and then 'a' with 'd'.

E. Maximize!

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a multiset S consisting of positive integers (initially empty). There are two kind of queries:

1. Add a positive integer to S, the newly added integer is not less than any number in it.
2. Find a subset s of the set S such that the value $\max(s) - \mathrm{mean}(s)$ is maximum possible. Here $max(s)$ means maximum value of elements in s, $\mathrm{mean}(s)$ — the average value of numbers in s. Output this maximum possible value of $\max(s) - \mathrm{mean}(s)$.

Input

The first line contains a single integer Q ($1 \le Q \le 5 \cdot 10^5$) — the number of queries.

Each of the next Q lines contains a description of query. For queries of type 1 two integers 1 and x are given, where x ($1 \le x \le 10^9$) is a number that you should add to S. It's guaranteed that x is not less than any number in S. For queries of type 2, a single integer 2 is given.

It's guaranteed that the first query has type 1, i. e. S is not empty when a query of type 2 comes.

Output

Output the answer for each query of the second type in the order these queries are given in input. Each number should be printed in separate line.

Your answer is considered correct, if each of your answers has absolute or relative error not greater than 10^{-6}.

Formally, let your answer be a, and the jury's answer be b. Your answer is considered correct if $\frac{|a-b|}{\max(1,|b|)} \le 10^{-6}$.

Examples

input

```
6
1 3
2
1 4
2
1 8
2
```

output

```
0.0000000000
0.5000000000
3.0000000000
```

input

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

output

```
2.0000000000
```

F. Cutlet

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Arkady wants to have a dinner. He has just returned from a shop where he has bought a semifinished cutlet. He only needs to fry it. The cutlet should be fried for $2n$ seconds, in particular, it should be fried for n seconds on one side and n seconds on the other side. Arkady has already got a frying pan and turn on fire, but understood that maybe he won't be able to flip the cutlet exactly after n seconds after the beginning of cooking.

Arkady is too busy with sorting sticker packs in his favorite messenger and can flip the cutlet only in some periods of time. Namely, there are k periods of time in which he can do it, the i-th of them is an interval of time from l_i seconds after he starts cooking till r_i seconds, inclusive. Arkady decided that it's not required to flip the cutlet exactly in the middle of cooking, instead, he will flip it several times in such a way that the cutlet will be fried exactly n seconds on one side and n seconds on the other side in total.

Help Arkady and find out if it's possible for him to cook the cutlet, if he is able to flip the cutlet only in given periods of time; and if yes, find the minimum number of flips he needs to cook the cutlet.

Input

The first line contains two integers n and k $(1 \le n \le 100\,000,\ 1 \le k \le 100)$ — the number of seconds the cutlet should be cooked on each side and number of periods of time in which Arkady can flip it.

The next k lines contain descriptions of these intervals. Each line contains two integers l_i and r_i $(0 \le l_i \le r_i \le 2 \cdot n)$, meaning that Arkady can flip the cutlet in any moment starting from l_i seconds after the beginning of cooking and finishing at r_i seconds after beginning of cooking. In particular, if $l_i = r_i$ then Arkady can flip the cutlet only in the moment $l_i = r_i$. It's guaranteed that $l_i > r_{i-1}$ for all $2 \le i \le k$.

Output

Output "Hungry" if Arkady won't be able to fry the cutlet for exactly n seconds on one side and exactly n seconds on the other side.

Otherwise, output "Full" in the first line, and the minimum number of times he should flip the cutlet in the second line.

Examples

input

```
10 2
3 5
11 13
```

output

```
Full
2
```

input

```
10 3
3 5
9 10
11 13
```

output

```
Full
1
```

input

```
20 1
3 19
```

output

```
Hungry
```

Note

In the first example Arkady should flip the cutlet in time moment 3 seconds after he starts cooking and in time moment 13 seconds after he starts cooking.

In the second example, Arkady can flip the cutlet at 10 seconds after he starts cooking.