A. Magician

Fantasy magicians usually gain their ability through one of three usual methods: possessing it as an innate talent, gaining it through study and practice, or receiving it from another being, often a god, spirit, or demon of some sort. Some wizards are depicted as having a special gift which sets them apart from the vast majority of characters in fantasy worlds who are unable to learn magic.

Magicians, sorcerers, wizards, magi, and practitioners of magic by other titles have appeared in myths, folktales, and literature throughout recorded history, with fantasy works drawing from this background.

In medieval chivalric romance, the wizard often appears as a wise old man and acts as a mentor, with Merlin from the King Arthur stories representing a prime example. Other magicians can appear as villains, hostile to the hero.

Mr. Zstu is a magician, he has many elves like dobby, each of which has a magic power (maybe negative). One day, Mr. Zstu want to test his ability of doing some magic. He made the elves stand in a straight line, from position 1 to position n, and he used two kinds of magic, Change magic and Query Magic, the first is to change an elf's power, the second is get the maximum sum of beautiful subsequence of a given interval. A beautiful subsequence is a subsequence that all the adjacent pairs of elves in the sequence have a different parity of position. Can you do the same thing as Mr. Zstu ?

Input

The first line is an integer T represent the number of test cases.
Each of the test case begins with two integers n, m represent the number of elves and the number of time that Mr. Zstu used his magic.
(n,m <= 100000)
The next line has n integers represent elves' magic power, magic power is between -1000000000 and 1000000000.
Followed m lines, each line has three integers like
type a b describe a magic.
If type equals 0, you should output the maximum sum of beautiful subsequence of interval [a,b].(1 <= a <= b <= n)
If type equals 1, you should change the magic power of the elf at position a to b.(1 <= a <= n, 1 <= b <= 1e9)

Output

For each 0 type query, output the corresponding answer.

Sample Input

```
1
1 1
1
0 1 1
```

Sample Output

```
1
```

B. RGCDQ

Mr. Hdu is interested in Greatest Common Divisor (GCD). He wants to find more and more interesting things about GCD. Today He comes up with Range Greatest Common Divisor Query (RGCDQ). What's RGCDQ? Please let me explain it to you gradually. For a positive integer x, F(x) indicates the number of kind of prime factor of x. For example F(2)=1. F(10)=2, because 10=2*5. F(12)=2, because 12=2*2*3, there are two kinds of prime factor. For each query, we will get an interval [L, R], Hdu wants to know $\max GCD(F(i), F(j))$ $(L \leq i < j \leq R)$

Input

There are multiple queries. In the first line of the input file there is an integer T indicates the number of queries.
In the next T lines, each line contains L, R which is mentioned above.

All input items are integers.
1<= T <= 1000000
2<=L < R<=1000000

Output

For each query，output the answer in a single line.
See the sample for more details.

Sample Input

```
2
2 3
3 5
```

Sample Output

```
1
1
```

C. The Goddess Of The Moon

Chang’e （嫦娥） is a well-known character in Chinese ancient mythology. She’s the goddess of the Moon. There are many tales about Chang'e, but there's a well-known story regarding the origin of the Mid-Autumn Moon Festival. In a very distant past, ten suns had risen together to the heavens, thus causing hardship for the people. The archer Yi shot down nine of them and was given the elixir of immortality as a reward, but he did not consume it as he did not want to gain immortality without his beloved wife Chang'e.

However, while Yi went out hunting, Fengmeng broke into his house and forced Chang'e to give up the elixir of immortality to him, but she refused to do so. Instead, Chang'e drank it and flew upwards towards the heavens, choosing the moon as residence to be nearby her beloved husband.

Yi discovered what had transpired and felt sad, so he displayed the fruits and cakes that his wife Chang'e had liked, and gave sacrifices to her. Now, let’s help Yi to the moon so that he can see his beloved wife. Imagine the earth is a point and the moon is also a point, there are n kinds of short chains in the earth, each chain is described as a number, we can also take it as a string, the quantity of each kind of chain is infinite. The only condition that a string A connect another string B is there is a suffix of A , equals a prefix of B, and the length of the suffix(prefix) must bigger than one(just make the joint more stable for security concern), Yi can connect some of the chains to make a long chain so that he can reach the moon, but before he connect the chains, he wonders that how many different long chains he can make if he choose m chains from the original chains.

Input

The first line is an integer T represent the number of test cases.
Each of the test case begins with two integers n, m.
(n <= 50, m <= 1e9)
The following line contains n integer numbers describe the n kinds of chains.
All the Integers are less or equal than 1e9.

Output

Output the answer mod 1000000007.

Sample Input

```
2
10 50
12 1213 1212 1313231 12312413 12312 4123 1231 3 131
5 50
121 123 213 132 321
```

Sample Output

```
86814837
797922656
```

D. Painter

Mr. Hdu is an painter, as we all know, painters need ideas to innovate , one day, he got stuck in rut and the ideas dry up, he took out a drawing board and began to draw casually. Imagine the board is a rectangle, consists of several square grids. He drew diagonally, so there are two kinds of draws, one is like '\' , the other is like '/'. In each draw he choose arbitrary number of grids to draw. He always drew the first kind in red color, and drew the other kind in blue color, when a grid is drew by both red and blue, it becomes green. A grid will never be drew by the same color more than one time. Now give you the ultimate state of the board, can you calculate the minimum time of draws to reach this state.

Input

The first line is an integer T describe the number of test cases.
Each test case begins with an integer number n describe the number of rows of the drawing board.
Then n lines of string consist of 'R' 'B' 'G' and '.' of the same length. '.' means the grid has not been drawn.
1<=n<=50
The number of column of the rectangle is also less than 50.
Output
Output an integer as described in the problem description.

Output

Output an integer as described in the problem description.

Sample Input

```
2
4
RR.B
.RG.
.BRR
B..R
4
RRBB
RGGB
BGGR
BBRR
```

Sample Output

```
3
6
```

E. Fan Li

Fan Li (范蠡) was an ancient Chinese advisor in the state of Yue in the Spring and Autumn period. He is a successful militarist and a successful business man. He is one of the main characters of a famous Chinese proverb “卧薪尝胆”. One day, when he was training the army, he came up with an idea, if he let all the soldiers stand in a line (every soldier has a fighting capacity), what is the maximum disjoint intervals he can choose so that the greatest common divisor of all the intervals are equal, and how many ways can he choose the maximum disjoint intervals satisfy the condition. The different ways may be very large, output the answer mod 998244353.

Input

There are multiple test cases.
Each test cases begins with an integer n, then followed n positive integers.
1 <= n <= 100000
All the integers are less than 2333333.

Output

For each test case, output the number of maximum intervals and the ways of reach the maximum number.

Sample Input

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

Sample Output

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

F. Beautiful Set

I've read many problems in my ICPC career, sometimes the meaning of a problem often makes me confused.
When I read a problem more than three times and still can't get the idea what is the problem saying about, I may become like this

or

I hope you won't be the above person after you read this problem.
Mr. Zstu and Mr. Hdu get a set of numbers $\{A_1, A_2, \ldots, A_n\}$, they have different opinions about the beautiful value of the set.
Mr. Zstu defines the beautiful value like this:
Make the set become a sequence, the beautiful value of the sequence is the sum of all the interval's gcd(greatest common divisor), and the beautiful value of the set is the sum of the beautiful value of all the possible sequence. For example, set$\{1, 2, 3\}$ can be six different sequence $\{1, 2, 3\}$,$\{1, 3, 2\}$,$\{2, 1, 3\}$,$\{2, 3, 1\}$,$\{3, 1, 2\}$,$\{3, 2, 1\}$.

Mr. Hdu defines the beautiful value like this:
For k from 1 to n, choose k numbers of the set, and calculate the gcd of the k numbers. The beautiful value of the k numbers is k * (gcd of the k chosen numbers). The beautiful value of the set is the sum of all of the beautiful value of k numbers.
Which beautiful value is larger, Mr. Zstu and Mr. Hdu invite the judge Mr. Xiasha to help.
Given that both of the value are too big, the stupid Mr. Xiasha mod both of the values by 258280327, so here is the question, which value is bigger after mod operation?

Input

There are multiple test cases.
Each test case begins with an integer n$(1 \leq n \leq 100000)$
The next line is n integers $A_1, A_2, \ldots, A_n$
All of the integers are between 1 and 100000.

Output

For each test case, if the beautiful value is equal between Mr. Zstu and Mr. Hdu, output "Equal", followed the beautiful value , otherwise output the person's name with bigger beautiful value and followed the beautiful value.

Sample Input

```
2
2 3
1
233
```

Sample Output

```
Mr. Zstu 12
Equal 233
```

G. Hope

Hope is a good thing, which can help you conquer obstacles in your life, just keep fighting, and solve the problem below.

In mathematics, the notion of permutation relates to the act of arranging all the members of a set into some sequence or order, or if the set is already ordered, rearranging (reordering) its elements, a process called permuting. These differ from combinations, which are selections of some members of a set where order is disregarded. For example, written as tuples, there are six permutations of the set {1,2,3}, namely: (1,2,3), (1,3,2), (2,1,3), (2,3,1), (3,1,2), and (3,2,1). These are all the possible orderings of this three element set. As another example, an anagram of a word, all of whose letters are different, is a permutation of its letters. In this example, the letters are already ordered in the original word and the anagram is a reordering of the letters.

There is a permutation $A_1, A_2, \dots A_n$, now we define its value as below:

For each A_i, if there exists a minimum j satisfies $j > i$ and $A_j > A_i$, then connect an edge between A_i and A_j , so after we connect all the edges, there is a graph G, calculate the product of the number of nodes in each component as an integer P. The permutation value is P * P.Now, Mr. Zstu wants to know the sum of all the permutation value of n. In case the answer is very big, please output the answer mod 998244353.

Just in case some of you can't understand, all the permutations of 3 are

1 2 3
1 3 2
2 3 1
2 1 3
3 1 2
3 2 1

Input

There are multiple test cases.

There are no more than 10000 test cases.

Each test case is an integer n$(1 \leq n \leq 100000)$.

Output

For each test case, output the answer as described above.

Sample Input

```
1
2
```

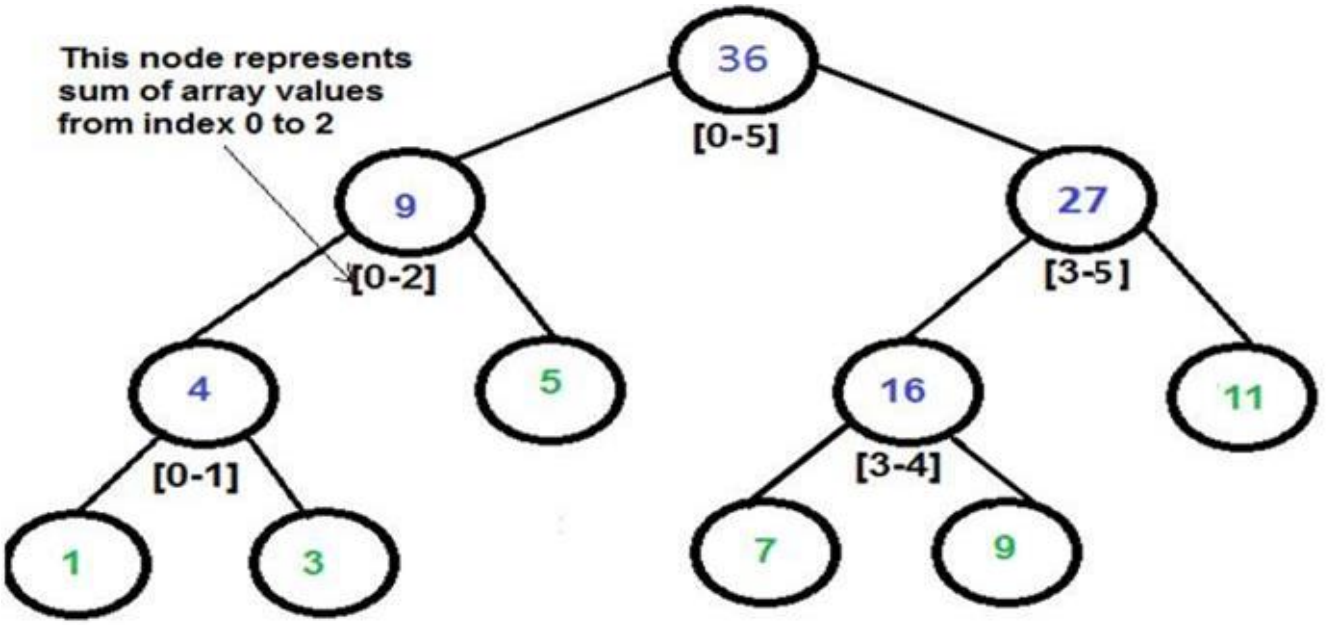
Sample Output

```
1
5
```

H. Solve this interesting problem

Segment Tree is a kind of binary tree, it can be defined as this:
- For each node u in Segment Tree, u has two values: L_u and R_u.
- If $L_u = R_u$, u is a leaf node.
- If $L_u \neq R_u$, u has two children x and y,with $L_x = L_u$,$R_x = \lfloor \frac{L_u+R_u}{2} \rfloor$,
$L_y = \lfloor \frac{L_u+R_u}{2} \rfloor + 1$,$R_y = R_u$.

Here is an example of segment tree to do range query of sum.



Segment Tree for input array {1, 3, 5, 7, 9, 11}

Given two integers L and R, Your task is to find the minimum non-negative n satisfy that: A Segment Tree with root node's value $L_{root} = 0$ and $R_{root} = n$ contains a node u with $L_u = L$ and $R_u = R$.

Input

The input consists of several test cases.
Each test case contains two integers L and R, as described above.
$0 \leq L \leq R \leq 10^9$
$\frac{L}{R-L+1} \leq 2015$

Output

For each test, output one line contains one integer. If there is no such n, just output -1.

Sample Input

```
6 7
10 13
10 11
```

Sample Output

```
7
-1
12
```

I. Boring Class

Mr. Zstu and Mr. Hdu are taking a boring class , Mr. Zstu comes up with a problem to kill time, Mr. Hdu thinks it's too easy, he solved it very quickly, what about you guys?
Here is the problem:
Give you two sequences $L_1, L_2, \ldots, L_n$ and $R_1, R_2, \ldots, R_n$.
Your task is to find a longest subsequence $v_1, v_2, \ldots v_m$ satisfies
$v_1 \geq 1, v_m \leq n, v_i < v_{i+1}$.(for i from 1 to m - 1)
$L_{v_i} \geq L_{v_{i+1}}, R_{v_i} \leq R_{v_{i+1}}$(for i from 1 to m - 1)
If there are many longest subsequence satisfy the condition, output the sequence which has the smallest lexicographic order.

Input

There are several test cases, each test case begins with an integer n.
$1 \leq n \leq 50000$
Both of the following two lines contain n integers describe the two sequences.
$1 \leq L_i, R_i \leq 10^9$

Output

For each test case ,output the an integer m indicates the length of the longest subsequence as described.
Output m integers in the next line.

Sample Input

```
5
5 4 3 2 1
6 7 8 9 10
2
1 2
3 4
```

Sample Output

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

J. Crazy Bobo

Bobo has a tree,whose vertices are conveniently labeled by 1,2,...,n.Each node has a weight w_i . All the weights are distrinct.
A set with m nodes $v_1, v_2, \ldots, v_m$ is a Bobo Set if:
- The subgraph of his tree induced by this set is connected.
- After we sort these nodes in set by their weights in ascending order,we get $u_1, u_2, \ldots, u_m$, (that is,$w_{u_i} < w_{u_{i+1}}$ for i from 1 to m-1).For any node x in the path from u_i to u_{i+1} (excluding u_i and u_{i+1}),should satisfy $w_x < w_{u_i}$.

Your task is to find the maximum size of Bobo Set in a given tree.

Input

The input consists of several tests. For each tests:
The first line contains a integer n ($1 \leq n \leq 500000$). Then following a line contains n integers $w_1, w_2, \ldots, w_n$ ($1 \leq w_i \leq 10^9$,all the w_i is distrinct).Each of the following n-1 lines contain 2 integers a_i and b_i ,denoting an edge between vertices a_i and b_i ($1 \leq a_i, b_i \leq n$).
The sum of n is not bigger than 800000.

Output

For each test output one line contains a integer,denoting the maximum size of Bobo Set.

Sample Input

```
7
3 30 350 100 200 300 400
1 2
2 3
3 4
4 5
5 6
6 7
```

Sample Output

```
5
```

K. Work

It’s an interesting experience to move from ICPC to work, end my college life and start a brand new journey in company.
As is known to all, every stuff in a company has a title, everyone except the boss has a direct leader, and all the relationship forms a tree. If A’s title is higher than B(A is the direct or indirect leader of B), we call it A manages B.
Now, give you the relation of a company, can you calculate how many people manage k people.

Input

There are multiple test cases.
Each test case begins with two integers n and k, n indicates the number of stuff of the company.
Each of the following n-1 lines has two integers A and B, means A is the direct leader of B.

1 <= n <= 100 , 0 <= k < n
1 <= A, B <= n

Output

For each test case, output the answer as described above.

Sample Input

```
7 2
1 2
1 3
2 4
2 5
3 6
3 7
```

Sample Output

```
2
```