A. On Segment's Own Points

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

Our old friend Alexey has finally entered the University of City N — the Berland capital. Alexey expected his father to get him a place to live in but his father said it was high time for Alexey to practice some financial independence. So, Alexey is living in a dorm.

The dorm has exactly one straight dryer — a 100 centimeter long rope to hang clothes on. The dryer has got a coordinate system installed: the leftmost end of the dryer has coordinate 0, and the opposite end has coordinate 100. Overall, the university has n students. Dean's office allows i-th student to use the segment (l_i, r_i) of the dryer. However, the dean's office actions are contradictory and now one part of the dryer can belong to multiple students!

Alexey don't like when someone touch his clothes. That's why he want make it impossible to someone clothes touch his ones. So Alexey wonders: what is the total length of the parts of the dryer that he may use in a such way that clothes of the others $(n - 1)$ students aren't drying there. Help him! Note that Alexey, as the most respected student, has number 1.

Input

The first line contains a positive integer n ($1 \le n \le 100$). The $(i+1)$-th line contains integers l_i and r_i ($0 \le l_i < r_i \le 100$) — the endpoints of the corresponding segment for the i-th student.

Output

On a single line print a single number k, equal to the sum of lengths of the parts of the dryer which are inside Alexey's segment and are outside all other segments.

Sample test(s)

input

```
3
0 5
2 8
1 6
```

output

```
1
```

input

```
3
0 10
1 5
7 15
```

output

```
3
```

Note

Note that it's not important are clothes drying on the touching segments (e.g. $(0, 1)$ and $(1, 2)$) considered to be touching or not because you need to find the length of segments.

In the first test sample Alexey may use the only segment $(0, 1)$. In such case his clothes will not touch clothes on the segments $(1, 6)$ and $(2, 8)$. The length of segment $(0, 1)$ is 1.

In the second test sample Alexey may dry his clothes on segments $(0, 1)$ and $(5, 7)$. Overall length of these segments is 3.

B. On Corruption and Numbers

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

Alexey, a merry Berland entrant, got sick of the gray reality and he zealously wants to go to university. There are a lot of universities nowadays, so Alexey is getting lost in the diversity — he has not yet decided what profession he wants to get. At school, he had bad grades in all subjects, and it's only thanks to wealthy parents that he was able to obtain the graduation certificate.

The situation is complicated by the fact that each high education institution has the determined amount of voluntary donations, paid by the new students for admission — n_i berubleys. He cannot pay more than n_i, because then the difference between the paid amount and n_i can be regarded as a bribe!

Each rector is wearing the distinctive uniform of his university. Therefore, the uniform's pockets cannot contain coins of denomination more than r_i. The rector also does not carry coins of denomination less than l_i in his pocket — because if everyone pays him with so small coins, they gather a lot of weight and the pocket tears. Therefore, a donation can be paid only by coins of denomination x berubleys, where $l_i \le x \le r_i$ (Berland uses coins of any positive integer denomination). Alexey can use the coins of different denominations and he can use the coins of the same denomination any number of times. When Alexey was first confronted with such orders, he was puzzled because it turned out that not all universities can accept him! Alexey is very afraid of going into the army (even though he had long wanted to get the green uniform, but his dad says that the army bullies will beat his son and he cannot pay to ensure the boy's safety). So, Alexey wants to know for sure which universities he can enter so that he could quickly choose his alma mater.

Thanks to the parents, Alexey is not limited in money and we can assume that he has an unlimited number of coins of each type.

In other words, you are given t requests, each of them contains numbers n_i, l_i, r_i. For each query you need to answer, whether it is possible to gather the sum of exactly n_i berubleys using only coins with an integer denomination from l_i to r_i berubleys. You can use coins of different denominations. Coins of each denomination can be used any number of times.

Input

The first line contains the number of universities t, $(1 \le t \le 1000)$ Each of the next t lines contain three space-separated integers: n_i, l_i, r_i $(1 \le n_i, l_i, r_i \le 10^9;\ l_i \le r_i)$.

Output

For each query print on a single line: either "`Yes`", if Alexey can enter the university, or "`No`" otherwise.

Sample test(s)

input

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

output

```
Yes
No
```

Note

You can pay the donation to the first university with two coins: one of denomination 2 and one of denomination 3 berubleys. The donation to the second university cannot be paid.

C. On Number of Decompositions into Multipliers

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

You are given an integer m as a product of integers $a_1, a_2, \ldots a_n$ $(m = \prod_{i=1}^{n} a_i)$. Your task is to find the number of distinct decompositions of number m into the product of n ordered positive integers.

Decomposition into n products, given in the input, must also be considered in the answer. As the answer can be very large, print it modulo 1000000007 $(10^9 + 7)$.

Input

The first line contains positive integer n $(1 \le n \le 500)$. The second line contains space-separated integers $a_1, a_2, \ldots, a_n$ $(1 \le a_i \le 10^9)$.

Output

In a single line print a single number k — the number of distinct decompositions of number m into n ordered multipliers modulo 1000000007 $(10^9 + 7)$.

Sample test(s)

input
```
1
15
```
output
```
1
```

input
```
3
1 1 2
```
output
```
3
```

input
```
2
5 7
```
output
```
4
```

Note

In the second sample, the get a decomposition of number 2, you need any one number out of three to equal 2, and the rest to equal 1.

In the third sample, the possible ways of decomposing into ordered multipliers are [7,5], [5,7], [1,35], [35,1].

A decomposition of positive integer m into n ordered multipliers is a cortege of positive integers $b = \{b_1, b_2, \ldots b_n\}$ such that $m = \prod_{i=1}^{n} b_i$. Two decompositions b and c are considered different, if there exists index i such that $b_i \neq c_i$.

D. On Sum of Fractions

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

Let's assume that

- $v(n)$ is the largest prime number, that does not exceed n;
- $u(n)$ is the smallest prime number strictly greater than n.

Find $\sum_{i=2}^{n} \frac{1}{v(i)u(i)}$.

Input

The first line contains integer t $(1 \le t \le 500)$ — the number of testscases.

Each of the following t lines of the input contains integer n $(2 \le n \le 10^9)$.

Output

Print t lines: the i-th of them must contain the answer to the i-th test as an irreducible fraction "p/q", where p, q are integers, $q > 0$.

Sample test(s)

input

```
2
2
3
```

output

```
1/6
7/30
```

E. On Changing Tree

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

You are given a rooted tree consisting of n vertices numbered from 1 to n. The root of the tree is a vertex number 1.

Initially all vertices contain number 0. Then come q queries, each query has one of the two types:

- The format of the query: $1\ v\ x\ k$. In response to the query, you need to add to the number at vertex v number x; to the numbers at the **descendants** of vertex v at distance 1, add $x - k$; and so on, to the numbers written in the descendants of vertex v at distance i, you need to add $x - (i \cdot k)$. The distance between two vertices is the number of edges in the shortest path between these vertices.
- The format of the query: $2\ v$. In reply to the query you should print the number written in vertex v modulo 1000000007 $(10^9 + 7)$.

Process the queries given in the input.

Input

The first line contains integer n $(1 \le n \le 3 \cdot 10^5)$ — the number of vertices in the tree. The second line contains $n - 1$ integers $p_2, p_3, \dots p_n$ $(1 \le p_i < i)$, where p_i is the number of the vertex that is the parent of vertex i in the tree.

The third line contains integer q $(1 \le q \le 3 \cdot 10^5)$ — the number of queries. Next q lines contain the queries, one per line. The first number in the line is $type$. It represents the type of the query. If $type = 1$, then next follow space-separated integers v, x, k $(1 \le v \le n;\ 0 \le x < 10^9 + 7;$ $0 \le k < 10^9 + 7)$. If $type = 2$, then next follows integer v $(1 \le v \le n)$ — the vertex where you need to find the value of the number.

Output

For each query of the second type print on a single line the number written in the vertex from the query. Print the number modulo 1000000007 $(10^9 + 7)$.

Sample test(s)

input

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

output

```
2
1
```

Note

You can read about a rooted tree here: `http://en.wikipedia.org/wiki/Tree_(graph_theory)`.