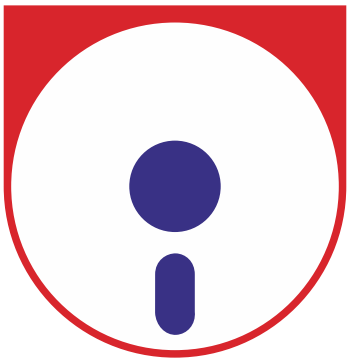


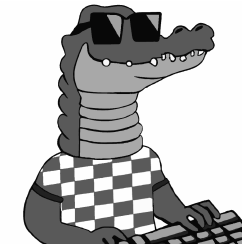
Croatian Open Competition in Informatics

Round 4, February 11th 2023

Tasks

Task	Time limit	Memory limit	Score
7Krokods	1 second	512 MiB	50
Zrinka	1 second	512 MiB	70
Bojanje	1 second	512 MiB	110
Mreža	5 seconds	512 MiB	110
Vrsta	1 second	512 MiB	110
Total			450

Task 7Krokods

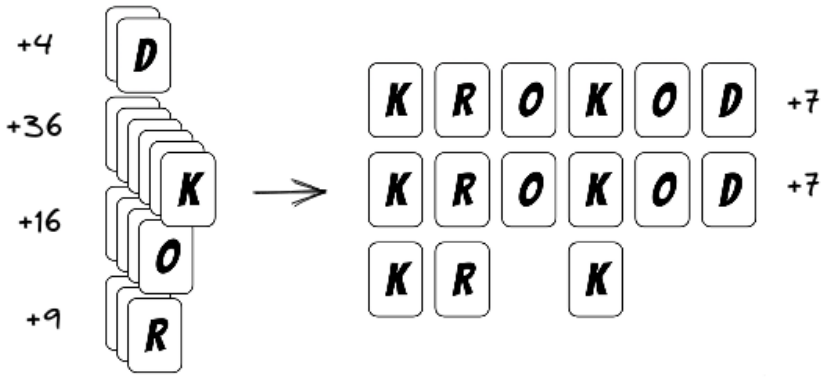


When he is not making videos for his YouTube channel, the famous programmer influencer Krokod likes to play boardgames with his friend Paula. He wants to play the game *7Krokods*, but Paula doesn't like complex games, so Krokod decided that they will play only with green and crocodile cards.

Paula has n green cards, and each of them has one of the following letters written on it: `d`, `k`, `o`, or `r`. Her total score is defined as the sum of the following components:

- For each letter, she gets as much points as is the number of cards with that letter written on them, squared. For example, if she has 6 cards with the letter `k`, she gets 36 points.
- For each word `krokod` she can make from her cards, she gets an extra 7 points.

Illustration of the first example.



Paula has 2 *letters* `d` ($2 \cdot 2 = 4$ points), 6 *letters* `k` ($6 \cdot 6 = 36$ points), 4 *letters* `o` ($4 \cdot 4 = 16$ points) *and* 3 *letters* `r` ($3 \cdot 3 = 9$ points). *The word* `krokod` *can be spelled* 2 *times* ($7 \cdot 2 = 14$ points). *Her total score is* 79 . ($4 + 36 + 16 + 9 + 14 = 79$)

Paula also has m crocodile cards. She can replace each of the crocodile cards with a green card having a letter of her choice. She will do it in a way that maximizes her score.

Help her determine the maximum score she can get with her cards.

Input

The first line contains integers n and m ($0 \leq n \leq 100, 0 \leq m \leq 10$), the number of green cards and the number of crocodile's cards.

The second line contains a sequence of n characters, where the i-th characters represents the letter on the i-th green card. The sequence consists only of characters `d`, `k`, `o` and `r`.

Output

In the first and only line output Paula's maximum possible score.

Scoring

Subtask	Points	Constraints
1	17	$m = 0$
2	26	$m = 1$
3	7	No additional constraints.

Examples

input	**input**	**input**
`15 0` `krokodkrokodkrk`	`5 1` `rokod`	`8 2` `ddkkoorr`
output	**output**	**output**
`79`	`17`	`35`

Clarification of the first example:
Look at the illustation in the task statement.

Clarification of the second example:
For the maximum possible score, Paula can replace her crocodile card with a green card having the letter `k`.

Task Zrinka

You are given two arrays of length n and m respectively, which consist only of 0's and 1's.

Your task is to replace every zero with an even positive integer and every one with an odd positive integer. After replacements both arrays should be increasing and you can use each postive integers at most once.

As this would be to easy, you are asked to do it such that the largest number you use is as small as possible.

Given two arrays, output the minimum possible largest number that needs to be used.

Input

The first array is of length n ($0 \leq n \leq 5\,000$), the second is of length m ($1 \leq m \leq 5\,000$).

The first line consists of $n+1$ integers, first being n, and others describing the first array.

The second line consists of $m+1$ integers, first being m, and others describing the second array.

Output

The first and only line should contain a positive integer, the answer to the question above.

Scoring

Subtask	Points	Constraints
1	15	$n = 0$
2	20	The first array consists only of 0's.
3	15	$n, m \leq 500$
4	20	No additional constraints.

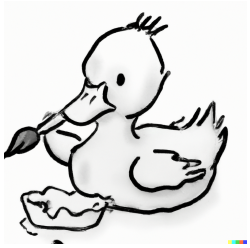
Examples

input	**input**	**input**
`0` `4 1 0 1 1`	`4 0 1 0 1` `4 1 0 0 1`	`5 0 1 0 0 1` `4 0 0 0 1`
output	**output**	**output**
`5`	`9`	`13`

Clarification of the second example:
One of the possible solutions is $(2, 3, 4, 5)$ and $(1, 6, 8, 9)$.

Clarification of the third example:
One of the possible solutions is $(2, 3, 6, 8, 9)$ and $(4, 10, 12, 13)$.

Task Bojanje



Oliver is a rubber duck that, not only finds bugs, but also likes to paint. His latest painting has n parts, each coloured with a unique colour. After he got a lot of critiques his painting is too predictable, he decided to modify his painting in t iterations. In every iteration he will do the following steps:

1. Oliver will select uniformly at random an index i ($1 \leq i \leq n$), and memorize the colour on the i-th part od the painting.
2. Again, Oliver will select uniformly at random an index j ($1 \leq j \leq n$). He will repaint the j-th part of the painting with the colour of the i-th part od the painting. If the j-th part is already painted in that colour, there is no change. Note that i can be equal to j.

Now, Oliver is afraid his painting will become monotonous or boring. He considers a painting good if there are at least k differents colours on it. Help him calculate the probability that his painting will be good at the end.

Input

The first line contains the numbers from the task statement n, t and k ($2 \leq k \leq n \leq 10, 1 \leq t \leq 10^{18}$).

Output

In the first and only line output the answer modulo $10^9 + 7$.

Formally, let $m = 10^9 + 7$. It can be shown that the answer can be expressed as an irreducible fraction $\frac{p}{q}$, where p and q are integers and $q \not\equiv 0 \pmod{m}$. Output the integer equal to $p \cdot q^{-1} \bmod m$. In other words, output such an integer x that $0 \leq x < m$ and $x \cdot q \equiv p \pmod{m}$.

Scoring

Subtask	Points	Constraints
1	30	$k = n$
2	40	$t \leq 1\,000$
3	40	No additional constraints.

Examples

input	**input**	**input**
`2 1 2`	`10 2 5`	`3 141592653589793 2`
output	**output**	**output**
`500000004`	`1`	`468261332`

Clarification of the first example:
On the painting there are two colours, so the probability that it remains the same after one iteration is $\frac{1}{2}$.

Clarification of the second example:
After two iterations, the number of different colours can't go from 10 to less than 5, so in every case the painting will have at least 5 different colours.

Task Mreža

The city mayor Mirko lives in a city with n neighborhoods connected with $n-1$ bidirectional roads such that from any neighborhood it is possible to reach every other neighborhood.

Mirko wants to upgrade some roads to reduce traffic. For every road, we know the current speed v_i vehicles drive on it, the price of upgrading c_i and the speed of driving after upgrading s_i.

There are q unsatisfied citizens that come to visit Mirko. Each one has their suggestion for an upgrade. The suggestion of the i-th citizen is: "We should invest e_i euros in upgrading roads between neighborhoods a_i and b_i"

For each suggestion, Mirko is interested in what is the minimum driving speed between neighborhoods a_i and b_i if he spends at most e_i euros on upgrading the roads, given thathis goal is to maximize the minimum driving speed between the neighborhoods a_i and b_i.

Mirko soon realized that calculating this is not an easy task and hired you to help him!

Input

The first line contains the integer n ($2 \leq n \leq 100,000$), the number of neighborhoods.

In each of the next $n-1$ lines there are five integers x_i, y_i, v_i, c_i, s_i ($1 \leq x_i, y_i \leq n, 1 \leq v_i < s_i \leq 10^9, 1 \leq c_i \leq 10^9$), denoting that neighborhood x_i and y_i are connected, current driving speed is v_i, cost of upgrading the road is c_i, and the speed on the road would be s_i.

The next line contains the integer q ($1 \leq q \leq 100\,000$), the number of unsatisfied citizens.

In each of the next q lines there are three integers a_i, b_i, e_i ($1 \leq a_i, b_i \leq n, a_i \neq b_i, 1 \leq e_i \leq 10^{18}$), which describe the suggestion of the i-th citizen.

Output

In the i-th of the q lines print the answer to the request of the i-th citizen.

Scoring

Subtask	Points	Constraints
1	21	$n, q \leq 1\,000$
2	29	Each of the neighborhoods will be connected with at most 2 other neighborhoods.
3	60	No additional constraints.

Examples

input

```
6
1 2 5 7 10
1 3 4 8 9
3 4 7 1 15
3 5 6 3 11
3 6 5 6 8
3
2 4 15
6 4 5
3 5 10
```

output

```
7
5
11
```

input

```
4
1 2 5 5 8
2 3 4 6 9
3 4 6 10 7
4
1 4 16
2 4 16
1 4 10
3 4 10
```

output

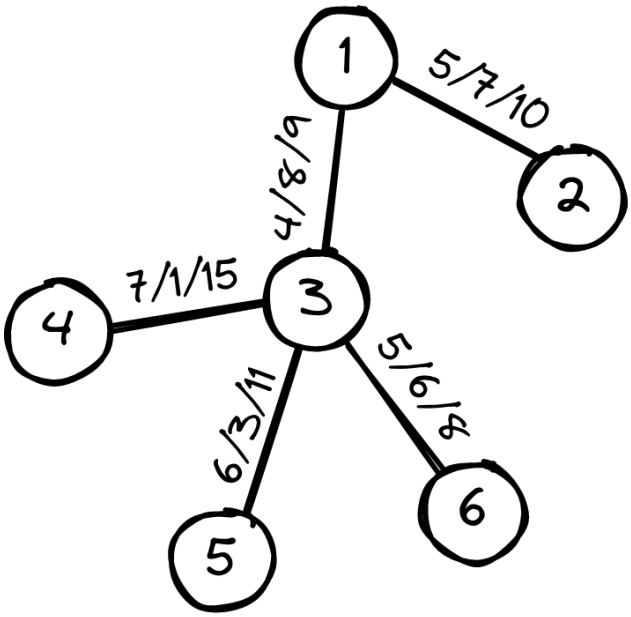
```
6
7
5
7
```

Clarification of the first example:
The illustration represents the city and its neighborhoods. On the edges are written the current driving speed, the cost of upgrading, and the speed after upgrading, respectively.

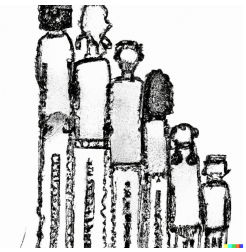
If we upgrade the roads between 1 and 2, and between 1 and 3, the driving speeds from 2 to 4 will be 10, 9, and 7 m/s. The minimum is 7 m/s.

If we upgrade the roads between 4 and 3, the driving speeds from 6 to 4 will be 5 an 15 m/s. The minimum is 5 m/s.

If we upgrade the road between 3 and 5, the driving speed from 5 to 3 will be 11 m/s.



Task Vrsta



Domagoj's favorite school subject is P.E. Every P.E. class starts with warm-up exercises. The teacher has an interesting way of choosing the student who will lead the warm-up. The students stand in a line sorted by their height. The teacher will choose the student that is standing in the middle of the line. If two students are in the middle, he will choose the shorter one. For example: if the students have heights 1 3 5 7 11, the student with height 5 will lead the warm-up exercises.

Domagoj does not remember how tall his classmates are. Luckily, next to him stands Lovro who is very good at estimating people's heights. He gives Domagoj n statements: "*There are a_i students entering the gym with height v_i*". After every statement said by Lovro, Domagoj is interested in the height of the student who will lead the warm-up, if only the students who entered the gym come to P.E. class. Help him answer his questions!

Input

The first line contains the integer n ($1 \leq n \leq 200,000$), the number of Lovro's statements.

The following n lines contain two integers v_i, a_i ($1 \leq v_i, a_i \leq 10^9$), the height and the number of students in Lovro's statement.

Output

In the i-th of n lines output the answer to Domagoj's question after i of Lovro's statements.

Scoring

Subtask	Points	Constraints
1	19	$n, v_i \leq 1\,000$
2	26	$a_1 = a_2 = \ldots = a_n = 1$
3	29	$v_1 < v_2 < \ldots < v_n$
4	36	No additional constraints.

Examples

input

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

output

```
2
2
2
```

input

```
4
17 2
23 5
11 4
9 5
```

output

```
17
23
17
11
```

input

```
3
10 20
100 5
1000 5
```

output

```
10
10
10
```