The International Collegiate Programming Contest
Sponsored by ICPC Foundation

The 2020 Algerian Collegiate Programming Contest

(Contest Problems)

Virtual
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Problem A. Diab's road to master

Input file:	`road.in`
Output file:	`standard output`
Balloon Color:	`Pink`

Diab is a great Competitive programmer and has a lot of knowledge in many topics but he doesn't focus on Cool forces rating, so he went to his friend in GUC Hemose to ask for help. Hemose is a GHOST on Cool forces (high rating). Diab will ask Hemose how to become a Ghost as fast as possible. Diab is so clever so he want to make sure that Hemose is a real Ghost and can coach him, so he gave him an easy task to solve, Hemose can't solve the task and he wants your help.

Diab gives Hemose an array **P** with **N** distinct strings and a set **S** of strings contains initially all strings of array **P** .Moreover, Hemose should process **M** queries. Each query is one of two kinds :

- 1 i, j $(1 \leq i, j \leq N)$ let $\mathbf{L} = LCS(P_i, P_j)$, for each string $\mathbf{x} \in SUFFIXES(L)$ and $\mathbf{x} \in \mathbf{P}$ if $\mathbf{x}$ in **S** then remove it from **S** otherwise add it to **S**, such that for any two strings A and B, **LCS(A , B)** is defined as the longest common suffix of A and B.
- 2 T where T is English lowercase string ($|T| \leq 10^5$),for all the palindromic substrings of string T print how many of them are in the set **S**.

You are given **M** queries you have to process all of them.

Input

The first line contains a single integer N, the number of the strings in P.

The second line contains N English lowercase strings, $P_1, P_2 ... P_N$ $(1 \leq |P_i| \leq 10^5)$, the elements of the array P.

The third line contains a single integer M, the number of the queries.

Each of the next M lines contains a single query with one of the two formats:

- 1 i, j $(1 \leq i, j \leq N)$.
- 2 T where T is English lowercase string ($|T| \leq 10^5$).

Summation the length of strings in P and strings in queries of type **2** $\leq 2 * 10^5$.

Output

For each query of type 2 print the answer to it.

Example

road.in	standard output
4 bb aa abba baa 3 2 aabbaa 1 2 3 2 aabbaa	4 4

Problem B. Electricity Towers

Input file:	`tower.in`
Output file:	`standard output`
Balloon Color:	`Brown`

There are N electricity towers in the city, the strength of the $i-th$ tower is a_i. Some of the towers have electricity transmission lines that allow the transmission of the electricity from one tower to another, such that there is exactly one single way to transmit the electricity from one tower to another.

The council has decided to do some maintenance work and they asked Ahmad to take over this task. Ahmad has proposed the following process to accomplish the task:

- First, He will choose one of the towers and switch it off **with all the transmission lines connected to it**, so this tower and all its transmission lines are now out of service and cannot send nor receive electricity.
- Then, He will choose a subset of towers and switch them off **but he will not switch off any transmission lines connected to them**. Those towers are now out of service, but the transmission lines connected to them are still working.
- He will choose all these towers such that, after switching them off, each tower will be able to transmit electricity to no more than K other towers that are still working and not out of service.

The council is interested in increasing the total sum of the strengths of towers that are still working. They gave Ahmad full control over the maintenance process and choosing the towers. They want to know what is the maximum total sum of strengths of the tower that are still working that he can achieve by choosing towers to switch of as the previous process. Can you help Ahmad with his task?

Input

The first line of the input contains one integer T, the number of test cases.

The first line of each test case contains two integers N, K $(1 \leq N \leq 10^5, 1 \leq K \leq 10^5)$ — the number of towers and the number K that the council has choosed.

The second line of each test case contains N integers $a_1, ..., a_n$ $(1 \leq a_i \leq 10^5)$ — where a_i is the strength of the $i-th$ tower.

Each of the following $n-1$ lines of each test cases contains two integers u, v $(1 \leq u, v \leq N)$, denoting that there is a transmission line between towers u and v.

It is guaranteed that the sum of N over all test cases does not exceed 2×10^5.

Output

For each test case print one integer, the maximum total sum of the strengths of towers that Ahmad can achieve.

Example

tower.in	standard output
1 5 1 3 1 4 2 5 1 2 2 3 3 4 4 5	12

Note

For the sample above,

- First, you will choose the tower 2 and switch it off with all the transmission lines connected to it.
- Then, you will choose a subset that contains one tower $\{4\}$ to switch it off without the transmission lines.
- Now, the towers that are still working are towers $1, 3, 5$. Tower 1 cannot transmit electricity to any other tower. Tower 3 can transmit electricity to one tower which is tower 5. Tower 5 can transmit electricity to tower 3. So the towers $1, 3, 5$ can transmit electricity to $0, 1, 1$ other towers respectively. No tower can transmit electricity to more than K other towers.

Problem C. Pyramids

Input file:	`rock.in`
Output file:	`standard output`
Balloon Color:	`Orange`

Pharaohs are famous of building pyramids.

The pharaoh Khofo has n rocks and wants to tell his builders to start building the pyramids but before that he wants to know that does these rocks can be used to build any number of pyramids without leaving any rock or not?.

The pyramid height should be > 1.

let p_i is the number of rocks needed to build a pyramid of height i.

$p_2 = 3$.

$p_i =$ i $+ p_{i-1}$. where $i > 2$

The pharaoh Khofo needs your help to tell him does these rocks can be used to build pyramids using all the n rocks or not.

Note : you can build any number of pyramids of any heights from the given n.

Input

The first line contains the number of test cases t ($1 \leq t \leq 10^5$).

for each test case You are given a single integer n ($1 \leq n \leq 10^6$) — The number of rocks.

Output

Print t lines, each containing either a "Yes"if the number of rocks can be used to build pyramids otherwise print "No".

Example

rock.in	standard output
4 1 3 4 13	NO YES NO YES

Problem D. Card Game

Input file:	`card.in`
Output file:	`standard output`
Balloon Color:	`Yellow`

Youssef and his friend Rashad like to enjoy their time by playing some games. They are bored of all games they have tried before and decided to invent new games using cards.

They brought a deck of $2N$ cards, each card has a **distinct** number written on it. Each player will take N cards and they will start playing alternatively.

Youssef will start playing the first turn, he can choose any card from his hand and play it on this turn.

Starting from the second turn the player who has the turn must play a card **larger than the largest** card played so far OR a card **smaller than the smallest** card so far.

The player who can't play loses.If both players played optimally, can you determine who is the winner?

Input

The first line contains a single integer T, the number of test cases.

The first line of each test case contains two Integers N ($1 \leq N \leq 2 \times 10^5$), the lenght of the sequence.

The second line of each test case contains N integers $A_1, ..., A_n$, ($1 \leq A_i \leq 10^9$), where A_i is the $i - th$ card with Youssef.

The third line of each test case contains N integers $B_1, ..., B_n$, ($1 \leq B_i \leq 10^9$), where B_i is the $i - th$ card with Rashad.

It is guaranted that $2 \times N$ values are distinct in each test case.

It is guaranteed that the sum of N over all test cases will not exceed 2×10^5.

Output

For each test case print `"Youssef"` if Youssef will win, otherwise print `"Rashad"` (without the quotes).

Example

card.in	standard output
3 4 1 3 5 8 2 4 6 7 2 2 8 1 10 3 1 2 9 3 4 10	Youssef Rashad Youssef

Problem E. Luka and Compiler's Brother

Input file:	`luka.in`
Output file:	`standard output`
Balloon Color:	`Gold`

Luka and Compiler's brother went shopping in a weird shop. It has a weird method for calculating the price of a purchase.

The shop sells n kinds of items. Each item has a digit s_i $(1 \leq i \leq n)$ corresponding to it.

A purchase is a non-empty subsequence of different items.

A subsequence is a sequence that can be derived from the given sequence by deleting zero or more elements without changing the order of the remaining elements.

The price of a purchase is the integer resulting from the concatenation of the digits of the items that are in the purchase in the order they appear in the string.

For example, if the shop sells 6 items 102045, and the purchase is the subsequence containing items with indices $[2, 3, 4, 6]$. Then the concatenation would be 0205 and the final price would be 205.

Calculate the summation of all possible different purchases modulo $10^9 + 7$. Two purchases are different if there is an item in one of them that doesn't appear in the other one.

Input

The first line contains a single integer t — the number of test cases.

The first line of each test case contains a single integer $n (1 \leq n \leq 10^6)$ — the number of items.

The second line contains a string s of n digits $s_1 s_2 ... s_n$ $(0 \leq s_i \leq 9)$.

The summation of n over all test cases $\leq 2 \cdot 10^6$

Output

The summation of all possible different purchases modulo $10^9 + 7$.

Example

luka.in	standard output
2 3 313 1 5	397 5

Problem F. Game

Input file:	`game.in`
Output file:	`standard output`
Balloon Color:	`Light Green`

After competing for a 5 hours contest, Youssef invented a game and asked his friend Rashad to play it.

Youssef will at first construct a sequence of N positive integers and give it to Rashad and ask him to do some operations to make the sequence of length one.

Operation goes as following: Rashad will choose different indices $i, j (i \neq j)$, then he will remove one of these 2 chosen elements, The cost of this operation sum of 2 chosen elements.

For example, if the initial sequence $[5, 2, 4, 1, 7]$. if Rashad chose indices 1 and 3 $[\mathbf{5}, 2, \mathbf{4}, 1, 7]$. He can remove any of them, the sequence can be $[2, \mathbf{4}, 1, 7]$ or $[\mathbf{5}, 2, 1, 7]$. The cost of this operation will be equal to 9.

Yousef asked Rashad what is the minimum cost needed to make the sequence of length one. Rashad could answer Youssef and now it's your turn to try this interesting game.

Input

The first line contains a single integer T, the number of test cases.

The first line of each test case contains two Integers N $(1 \leq N \leq 2 \times 10^5)$, the lenght of the sequence.

The second line of each test case contains N integers $A_1, ..., A_n$, $(1 \leq A_i \leq 10^9)$, where A_i is the value of the $i - th$ position.

It is guaranteed that the sum of N over all test cases will not exceed 2×10^5.

Output

For each test case print one integer,the minimum cost needed to make the sequence of length one.

Example

game.in	standard output
2 3 1 1 1 5 5 2 4 1 7	4 22

Problem G. Coffee Cups

Input file:	`cups.in`
Output file:	`standard output`
Balloon Color:	`Blue`

After winning a game, Khaled, Hassan, and Majd decided to take a break to drink coffee. They decided to travel to Brazil to buy three cups of coffee there and then go back to their Home country.

They entered the first coffee house they came across. They were presented N cups of coffee. The beauty of the $i-th$ cup is a_i. A triplet $(i < j < k)$ of coffee cups is called a good triplet if it satisfies the following conditions:

- $a_i - a_j = a_k - a_j$.
- $a_i - a_j > 0$.

Hassan has introduced the function $f(L, R)$, which equals to the number of good triplets of coffee cups, that can be formed of cups in the subarray $a_L, a_{L+1}, ..., a_R$.

Majd wonders if he can find the sum of $f(L, R)$ for all $L \leq R$. Can you help him?

Input

The first line of the input contains one integer T, the number of test cases.

The first line of each test case contains one integer N $(1 \leq N \leq 10^6)$, the number of coffee cups.

The second line of each test case contains N integers $a_1, ..., a_n$ $(1 \leq a_i \leq N)$, where a_i is the beauty of the $i - th$ cup.

It is guaranteed that he sum of N over all test cases does not exceed 2×10^6.

Output

For each test case print one integer, the sum of $f(L, R)$ for all $L \leq R$, print the answer modulo $10^9 + 7$.

Example

cups.in	standard output
1 5 3 2 1 2 3	7

Problem H. Cakes

Input file:	cakes.in
Output file:	standard output
Balloon Color:	Navy

Ammar enjoys eating cakes, he likes a cake called "Romba". He felt very hungry after participating in the 2020 Africa and Arab Collegiate Programming Contest, so he decided to collect some cakes to eat.

Ammar is currently in the point $x = 0$.

It takes him one second to advance from point x to point $x + 1$.

And it takes him t_i seconds to eat the $i - th$ cake.

Ammar wants to eat as many cakes as possible, but he has only M second to finish his trip because he wants to watch the closing ceremony of MCPC. So he asks for your help, what is the maximum number of cakes that he can eat?

Note: It doesn't matter where he ends his walking, as he can watch the closing ceremony virtually.

Input

The first line contains a single integer T, the number of test cases.

The first line of each test case contains two Integers N, M $(1 \leq N \leq 2 \times 10^5, 1 \leq M \leq 10^{18})$, the number of cakes and the number of seconds that Ammar has.

The second line of each test case contains N integers $x_1, ..., x_n$, $(1 \leq x_i \leq 10^9)$, where x_i is the position of the $i - th$ cake.

The second line of each test case contains N integers $t_1, ..., t_n$, $(1 \leq t_i \leq 10^9)$, where t_i is the number of seconds that he needs to eat the $i - th$ cake.

It is guaranteed that the sum of N over all test cases will not exceed 4×10^5.

Output

For each test case print one integer, the max number of cakes that Ammar can eat, given that he has only M seconds to finish his trip.

Example

cakes.in	standard output
1 6 11 1 2 3 3 4 5 1 10 2 1 1 5	4

Note

For the sample above, Ammar will walk from $x = 0$ to $x = 4$, during his trip, he will eat the cakes that have indices $[1, 3, 4, 5]$ and it is the max number of cakes he can eat. It will take him in total 9 seconds. He will finish his trip in $x = 4$.

Problem I. One Swap

Input file:	one.in
Output file:	standard output
Balloon Color:	Violet

Ali is a person who refuses to accept any standard short of perfection. In other words, he is a perfectionist. For Ali, the array seems to be perfect if and only if it is **sorted**.

One day he decided to challenge his best friend Amr. He gave him an array of N positive integer called A and asked him to sort it. But it was an easy task and Amr could easily solve it.

So Ali decided to make the challenge more difficult and challenged Amr to try sorting the array using **exactly one swap** operation.

In swap operation, Amr can choose any two indices i and j $(1 \leq i, j \leq n, i \neq j)$ and do the following:

$A[i] = A[i] + A[j]$

$A[j] = A[i] - A[j]$

$A[i] = A[i] - A[j]$

In other words, he can choose 2 different indices in the array and change the value of the first element with second element and value of second element with the first element.

Could you help Amr and tell him if it is possilbe to do this task.

Input

The first line contains one Integer N $(1 \leq N \leq 2 \times 10^5)$, the size of the array.

The second line contains N integers $A_1, ..., A_n$, $(1 \leq A_i \leq 10^9)$, where A_i is the value of the $i-th$ position .

Output

print "YES"if Amr can sort the array using exactly one operation otherwise print "NO"(without the quotes).

Examples

one.in	standard output
3 5 9 2	NO
4 2 6 6 2	YES

Problem J. Min OR Path

Input file:	`min.in`
Output file:	`standard output`
Balloon Color:	`White`

Naruto and Sasuke are living in Konoha.

Konoha is a rectangular grid of size $n * m$. Each cell has a number written on it; the number on the cell (i, j) is a_{ij}.

Naruto is living is cell (sx, sy) and wants to visit Sasuke who lives in cell (ex, ey), they may be on the same cell.

In each step Naruto can move to any other cell that share the same edge with his current cell, in other words he can move $UP, DOWN, LEFT$ or $RIGHT$.

Between all the pathes Naruto can take to reach to Sasuke he wants to take the path that has the minimum *or path* including the start cell and the end cell.

The *or path* of some path is the OR of all numbers in all cells in this path.

Naruto needs your help to tell him what is the minimum *or path*.

Input

The first line contains a single integer $t(1 \leq t \leq 100)$ — the number of test cases.

For each test case.

The first line contains 2 integers $n, m(1 \leq n, m \leq 10^3)$.

Each line of the next n contains m integers where $(0 \leq a[i][j] \leq 10^9)$.

The last line contains 4 integers si, sj, ei, ej. $(1 \leq si, ei \leq n)$ $(1 \leq sj, ej \leq m)$

It is guaranteed that the sum of $n * m$ over all test cases does not exceed $10^6(\sum n * m \leq 10^6)$.

Output

For each test case, print the single integer — the minimum *or path*.

Example

min.in	standard output
2 3 3 0 1 4 4 8 5 7 1 9 1 1 3 3 3 3 5 4 2 4 1 2 1 5 4 3 3 2 2	9 5

Problem K. Palindromes

Input file:	`string.in`
Output file:	`standard output`
Balloon Color:	`Silver`

Given a string s of length n.

In one operation you can choose any index i from string s and erase it.

What is the minimum number of operations you can perform in order to make all the substrings of the resulting string are palindromes?

A palindrome is a string that reads the same backward as forward, for example strings "`z`", "`aaa`", "`aba`", "`abccba`" are palindromes, but strings "`nautoo`", "`compo`", "`ab`" are not.

Erasing index 3 from "`narutoo`" will be "`nautoo`".

Input

The first line contains a single integer $t(1 \leq t \leq 100)$ — the number of test cases.

You are given two lines for each test case.

The first line contains a single integer $n(1 \leq n \leq 10^5)$ — the string legnth.

The second line contains a string s of n lowercase english letters.

Output

For each test case, print the single integer — the minimum number of operations you can perform to make all the substrings of the resulting string plindroms.

Example

string.in	standard output
3 7 narutoo 2 is 4 good	5 1 2

Problem L. Valid Decryptions

Input file:	`valid.in`
Output file:	`standard output`
Balloon Color:	`Black`

Yazan was attending a MOOC about cryptography, the idea that he can encode and decode data using functions has fired his imagination. He said: "why can't I invent my own way to encrypt data?!".

He invented the function $encode(X)$ as follows:

- if $X = 1$ then $encode(X) = 1$.
- else, $encode(X) =$ the **minimum** divisor of $X > 1$.

Yazan initially has an array A of N elements. He was so proud of the function that he invented, so he decided to apply this function for every element of the array A, and got a new array B of N elements as follows:

- $B_1 = encode(A_1)$.
- $B_2 = encode(A_2)$.
- .
- .
- .
- $B_N = encode(A_N)$.

But he forgot what was the array A before he applied this function for every element in it. He remembers that the max value in the array A was **exactly** K. Given the array B and the max value in the array A, Can you help him to find the number of possible valid arrays A that he could have initially? Since the answer might be too big, print its remainder modulo $10^9 + 7$.

Input

The first line contains a single integer T, the number of test cases.

The first line of each test case contains two integers N, K ($1 \leq N \leq 2 \times 10^5, 1 \leq K \leq 10^7$), the number of elements of the array B and the max value in the array A that he has initially.

The second line of each test case contains N intergers, $B_1, B_2 ... B_N$ ($1 \leq B_i \leq K$), the elements of the array B.

It is guaranteed the the sum of N over all test cases does not exceed 10^6.

It is guaranteed that the array B is valid and there is at least one valid decryption.

Output

For each test case print a single integer, the number of possible valid arrays A the he could have initially, modulo $10^9 + 7$.

Example

valid.in	standard output
4 3 9 1 2 3 3 6 1 2 3 3 4 2 3 2 4 10 3 3 2 5	4 1 3 4

Note

For the first test case, there are 4 valid arrays the could be the array A:

- $[1, 2, 9]$.
- $[1, 4, 9]$.
- $[1, 6, 9]$.
- $[1, 8, 9]$.

The max values in each of the arrays is exactly 9, and if we apply the function $encode(X)$ over each element, we get the array B.

Problem M. Company's Name

Input file:	`name.in`
Output file:	`standard output`
Balloon Color:	`Dark Green`

Sab3awy is planning to launch a new company that produces n products, each one has a name S_i. and all the products have the same length k. Since Sab3awy is creative, he decided to change the company name.

However, Sab3awy is interested in choosing a good name. To do this, he decided to choose some products and rename them. To rename a product, he will rearrange the characters of each product name. For example "silent" could be rearranged to "listen".

Then he will append the new products names in any order, and the company's name will be the large name after concatenation.

The company's name is considered to be good if and only if it's **palindrome** and its size is as **maximum** as possible.

Since Sab3awy is very busy, he asked you to help him, what's the maximum palindrome name you can get after concatenating a subset of the new renamed products?

Input

The first line consists of a single integer T, denoting the number of test cases.

Each test case starts with a line containing 2 integers n, k ($1 \leq n, k \leq 10^5$) that denotes the number of strings and the length of each string respectively.

n lines follow. Each line contains a string S_i of length k, the products names.

It's guaranteed that S_i consists of lower case English letters only, and that the sum of $|S_i|$ over all test cases doesn't exceed 10^5.

Output

For each test case, print a single line containing a single integer denoting the maximum palindrome size of the new company's name.

Example

name.in	standard output
1 7 3 abc abc def ddd wtf fwt ftw	15

Note

A palindrome is a string that reads the same forward and backward. For example, "noon", "testset" and "a" are all palindromes, while "test" and "abc" are not.

In the sample the maximum palindrome name is "abcfwtdddtwfcba", so the length is 15.

Problem N. Falafel Sandwiches

Input file:	falafel.in
Output file:	standard output
Balloon Color:	Cyan

Zain and Ahmed decided to retire and stop doing competitive programming to open a new business and start gaining money. They thought of what kind of business they would open, sadly, they could not find any idea so they asked their friends. One of their friends, Jamil, suggested opening a fast-food restaurant. Zain and Ahmed liked the idea and decided to start a fast-food restaurant specialized in making "Falafel" – a popular food in Syria.

The restaurant was a huge success within its first days, so Zain and Ahmed decided to expand the restaurant services and added a new service, food delivery. They bought N cars to use in delivery, each car can hold **any** number of sandwiches.

Shortly after announcing the food delivery service, the restaurant got a call from a businessman, Basel. He wants to organize a feast, he ordered M falafel sandwiches. Basel was in a hurry and wanted the sandwiches to reach his home as fast as possible.

Now Zain and Ahmed need to calculate the delivery time. First, they will choose a subset of the cars they have (possibly all the cars). Then, they will distribute the M sandwiches over those cars. They have the freedom to decide how many sandwiches to put in each car. The cars will start going simultaneously to Basel home. Basel will be happy when all the M sandwiches are delivered to his home.

But the car speed will be affected by the number of sandwiches it holds. If Zain and Ahmed put K sandwiches in the $i-th$ car, then it will need $K \times t_i$ seconds to advance 1 meter. So it is important to distribute the sandwiches optimally over the cars to minimize the arrival time.

Basel asked them, what will it take to deliver all the M sandwiches to his home?. Since he is an important client, Zain and Ahmed need to calculate the minimum time to deliver all the M sandwiches, and they asked you to help them with this task. Given that the distance between the restaurant and Basel home is L meters.

Input

The first line of the input contains a single integer T — the number of test cases.

The first line of each test case contains three integers N, M, L ($1 \leq N, M, L \leq 2 \times 10^5$) — The number of cars that the restaurant has, the number of sandwiches that Basel ordered and the distance between the restaurant and Basel home.

The second line of each test case contains N integers $t_1, ..., t_n$ ($1 \leq t_i \leq 10^4$) — Where $K \times t_i$ is the number of seconds that the $i-th$ car takes to advance 1 meter holding K sandwiches.

It is guaranteed that the sum of each of N, M over all test cases does not exceed 4×10^5.

Output

For each test case print a single integer, the minimum number of seconds that it takes to deliver M sandwiches to Basel home.

Example

falafel.in	standard output
2 5 5 5 4 5 3 2 1 4 3 5 1 2 3 4	15 10

Note

For the first test case, it is optimal to choose the third, fourth and fifth car, and to put 1 sandwich in the third car, 1 sandwich in the fourth car and 3 sandwiches in the fifth car. Now the cars will need $3, 2, 3$ seconds to advance 1 meter, respectively. The three cars will reach Basel home in $15, 10, 15$ second, respectively. So the answer is 15.

Problem O. Chocolate

Input file:	`bar.in`
Output file:	`standard output`
Balloon Color:	`Red`

George is a kind kid who always loves to see everyone is happy.

As Christmas is near, he thought of buying his friends a chocolate which he loves the most.

The one bar of chocolate costs X dirham and he decided to buy one bar for each of his F friends.

Could you help George calculate the amount of money he needs to buy one chocolate bar for each of his friends.

Input

The first line contains two Integers F, X ($1 \leq F, X \leq 100$), the number of George's friends and the cost of one chocolate bar.

Output

Print one integer, the amount of money he needs to buy one chocolate bar for each of his friends.

Examples

bar.in	standard output
2 3	6
1 4	4

Problem P. XOR

Input file:	`xor.in`
Output file:	`standard output`
Balloon Color:	`Rose`

You're given a number N and your task is to count the number of pairs X and Y where $X \leq Y$ and both X and Y are less than 2^N, and the value of $X \oplus Y$ has **odd** number of ones in its binary representation, where $\oplus$ is the bitwise XOR.

As the answer maybe very large print it modulo $10^9 + 7$.

Input

The first and only line of the input contains the number N ($1 \leq |N| \leq 10^5$) where $|N|$ is the length of the number.

Output

In a single line print the answer to the problem

Example

xor.in	standard output
1 7	4096