The International Collegiate Programming Contest
Sponsored by ICPC Foundation

The 2023 ACPCTeensOnline Collegiate Programming Contest

(Contest Problems)

Online
July 2023

Problem A. SCPCTeens

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Red`

"I hate common mistakes."

— *Grouchy Smurf*

$SCPCTeens$ is not the name of this contest, but it's $SCPC\ Teens$.

This is a common mistake that every one falls into, there is a space between $SCPC$ and $Teens$.

given a string of size excatly 9 characters, which represents the wrong name of some contest, correct it. (by adding a space between the 4th and the 5th character).

Input

one line contains a string of excatly 9 characters,(the first five characters are Upper case English letters, and the remaining four characters are lower case English letters). represents the wrong name of the contest.

Output

Output one line contains a string of the correct name of the contest name for the input.

Examples

standard input	standard output
SCPCTeens	SCPC Teens
ECPCTeens	ECPC Teens
SMRFSecpc	SMRF Secpc

Problem B. SCPCteensQual2024

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Blue`

"I hate strings."

— *Grouchy Smurf*

Given a string of length 17, represent a wrong name, find the value of it's *wrongness*. the value of the wrongness of a string s.

let the string $T = SCPCteensQual2024$. The *wrongness* of a string S is the number of indices i from 1 to 17 such that $S[i] \neq T[i]$.

for example the wrong name $SCPCteensQual2023$ has 2 as the *wrongness* value. (for $i = 3 : S[i] =$ 't', while $T[i] =$ 'T'. and for $i = 17$ $S[i] =$ '3', while $T[i] =$ '4').

Input

You are given a string with length exactly 17 that may contains lowercase or uppercase or numbers.

Output

Print the wrongness value of the given string.

Examples

standard input	standard output
SCPCTeensQual2024	0
SCpctEEnsqUAL2023	10

Problem C. Qualifying Teams

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Yellow`

"I hate qualifications."

— *Grouchy Smurf*

There are N teams participate in this contest.

There are three types of teams for this contests, (Syrian Teens, Egyption Teens, Unofficial Teens).

The process of determining which teams will pass the contest: The judges start from the first team ending with the last team on the scoreboard, and they follow these rules:

1. If the team is a Syrian Teens team, he will pass the contest if the number of teams who have already passed is still lower than A+B.
2. If the team is an Egyptian Teens team, he will pass the contest only if the number of teams who have already passed is currently lower than A+B and the number of Egyptian Teens teams who have already passed is still lower than B.
3. An Unofficial team cannot pass at all.

A string S of length N is given, indicating the final scoreboard of this contest, if the i-th character is 'S', this means that the team ranked i-th on the contest is a Syrian team, if the i-th character is 'E', this means that the team ranked i-th on the contest is an Egyption team, if the i-th character is 'U', this means that the team ranked i-th on the contest is an Unofficial team.

Print N lines each line is either 'Yes' or 'No', 'Yes' if the i-th team passes the Qualification contest, 'No' otherwise.

Input

The first line contain three integers N,A,B ($2 \leq N \leq 10^5, 1 \leq A, B \leq 10^5$).

The second line contain a string of length N that may contains 'E', 'S' or 'U'.

It is guaranteed that $A + B \leq N$.

Output

Print N lines each line is either 'Yes' or 'No', 'Yes' if the i-th team passes the Qualification contest, 'No' otherwise.

Examples

standard input	standard output
5 1 2 ESUES	Yes Yes No Yes No
7 3 2 UUSSEEE	No No Yes Yes Yes Yes No

Problem D. Smurfy teams

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`White`

"I hate contests."

— Grouchy Smurf

There are N contestants who wants to participate in this contest, but as you may already know this contest is for teams of two contestants.

So the contestants has to form teams in order to participate. the contestants matching process is really hard, So we are going to automate it.

A team is considered $smurfy$ if each one of its contestant wants to form a team with the other one.

Count the numebr of $smurfy$ teams that can be formed.

Input

The fist line contain integer N (2<= N <= 1e5).

The second line contain an array of length N and each integer (1<=a[i]<=N, a[i] != i), means that the contestant number i wants to form a team with contestant number a[i].

Output

Print the number of smurfy teams.

Examples

standard input	standard output
4 2 1 4 3	2
3 3 1 2	0

Problem E. A Damsel In Distress

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Black`

"I hate passwords."

— *Grouchy Smurf*

Enamored Smurf has been in love with Smurfette ever since her arrival. He dreams about her, carves her name in trees, and pulls the petals off daisies, reciting "She loves me, she loves me not ..." When she loves him not, he cries all night.

Papa Smurf is telling a story about him to the Smurfs: ″Enamored Smurf recently found out that Gargamel got hold of Smurfette (Again...) and is keeping her in his cage in order to turn her into gold.

Enamored Smurf then (together with the rest of the Smurfs) went on to her rescue. Their plan was to lure Gargamel away from the cage and let Enamored Smurf, Hefty Smurf and Handy Smurf proceed to open the cage and rescue Smurfette.

But, it turns out that the cage is locked with a mechanical 3-digit password. Handy Smurf deduced that the password must be a sub-sequence of the string S that is near the cage.

The hhree smurfs are going to create the 3-digits password from it as following:

Enamored Smurf is going to choose index i ($1 \leq i \leq N-2$), then Smurf Handy is going to choose index j ($i+1 \leq j \leq N-1$), then Smurf Hefty is going to choose index k ($j+1 \leq k \leq N$).

Then the password is $S_i S_j S_k$.

And they proceeded to find the correct password and save Smurfette.″

After the story is over Brainy Smurf wondered how they found the password so quickly. And decide to count the number of possible distinct passwords that the three smurfs could've created using the string S from Papa's Story. And you decided to help him.

Input

You are given a String S ($3 \leq |S| \leq 10^5$), the string S from Papa's Story.

Output

Output one integer: the number of possible distinct passwords.

Examples

standard input	standard output
000	1
000111	4

Problem F. A Battle Over Smurfette (Resli's version)

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Green`

"I hate romance."

— *Grouchy Smurf*

Smurfette is the main protagonist and a female Smurf Before the smurflings created Sassette, Smurfette was the only female smurf in the Smurf village. Most of the time Smurfette is portrayed as an object of admiration of many other Smurfs, since she is the only female Smurf consistently in the village. She is usually hopeless in times of danger and sometimes thinks she knows it all, yet has a caring side as well. there are N Smurfs that are trying to win Smurfette's heart. So they decided to play a game to decide who is going to win her heart. They would stand in a line **from 1 to n and let Papa Smurf choose two random consecutive Smurfs that battle each other and the loser steps out of the line. this process will repeat $N-1$ times, until only one Smurf remains and be declared the winner. Papa Smurf knows the winner of any two Smurfs battle. And he wonders: how many smurf have a chance of winning?**

Input

You are given an integer N $(2 \leq N \leq 100)$ the number of Smurfs. Then a matrix A that consists of N strings follow: each string A_i has length N and consist only of zeros and ones. the i-th Smurf wins against j-th Smurf if and only if $A_{i,j} = 1$. it is guaranteed that $A_{i,j} = A_{j,i}$ and $A_{i,i} = 0$

Output

Output a single integer. the number of smurfs that have a chance of winning Smurfette heart.

Examples

standard input	standard output
4 0000 1010 1000 1110	1
4 0101 0010 1000 0110	2
3 010 001 100	2

Problem G. Smurfs' Village Trips

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Cyan`

I hate trips.

— *Grouchy Smurf*

Papa Smurf is the leader and elder of the Smurfs. He decided to start a series of trips around the village to raise moral of the smurf. All the smurfs were happy because of this announcement. Well..., except for Lazy Smurf. Who then proceeded to measure the of sum distances of all possible trips inside the Smurfs' Village. The Village has N sights and $N-1$ bidirectional roads connecting them, the i-th of them has a length of l_i. A trip plan is a permutation p of those sites. where the Smurfs go from site p_i to site p_{i+1} (for $i \leq N-1$) using the shortest path between them. Lazy smurf couldn't be bothered to calculate such a huge number. so he asks you to do it. Since it is a very big number he asks you to calculate it modulo 10^9+7. (since he is too lazy to read the whole number)

Input

You are given a single integer $N(1 \leq N \leq 10^5)$ the number of sites in the village. then N - 1 lines follow. The i-th of which has three integers: a_i, b_i, l_i $(1 \leq a_i, b_i \leq N,\ 1 \leq l_i \leq 10^9)$. which represent a road that connects site a_i with site b_i and has a length l_i.

Output

Output a single integer X: the sum distances of all possible trips inside the Smurfs' Village modulo 10^9+7.

Examples

standard input	standard output
2 1 2 2	4
4 1 2 3 2 3 2 3 4 2	276

Problem H. Pigeon Rides

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Bronze`

I hate pigeons.

— *Grouchy Smurf*

Handy Smurf is the handyman of the Smurfs. He helps fix things in the village and is known for his amazing technological inventions. Today he has invented a way to fly around the world. It's called a Pigeon Ride! thanks to the light weight of the Smurfs. a Pigeon is able to fly one Smurf across the planet and back. Not only that. But a pigeon can fly exactly two Smurfs to the sky (by installing another seat which weighs exactly 1), if their combined wight does not exceed C (with the extra seat). there are N Smurfs that want to travel to Smurfy Grove. each Smurf has a weight w_i. Since pigeons are costly. Handy Smurf asks you to find the minimum number of pigeons needed to transport all N Smurfs using his Pigeon Rides.

Input

You are given a single integer T which represent the number of test cases. For each test case: You are given two integers N and C ($1 \leq N \leq 10^5$, $1 \leq C \leq 10^9$). then the next line has N integers $w_i (1 \leq w_i \leq 10^9)$. the weight of the i-th Smurf.

Output

for each test case output a single integer. the minimum number of pigeons needed to transport all N Smurfs to the Smurfy Grove.

Example

standard input	standard output
2 3 5 1 2 4 4 12 1 2 3 2	2 2

Problem I. A Battle Over Smurfette (Shadi's version)

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Seliver`

I hate romance.

— *Grouchy Smurf*

Smurfette is the main protagonist and a female Smurf Before the smurflings created Sassette, Smurfette was the only female smurf in the Smurf village. Most of the time Smurfette is portrayed as an object of admiration of many other Smurfs, since she is the only female Smurf consistently in the village. She is usually hopeless in times of danger and sometimes thinks she knows it all, yet has a caring side as well. there are N Smurfs that are trying to win Smurfette's heart. So they decided to play a game to decide who is going to win her heart. They would stand **randomly in a line and let Papa Smurf choose two random consecutive Smurfs that battle each other and the loser steps out of the line. this process will repeat $N-1$ times, until only one Smurf remains and be declared the winner. Papa Smurf knows the winner of any two Smurfs battle. And he wonders: for all different permutations of the line the smurfs could be standing, how many smurf have a chance of winning?**

Input

You are given an integer N $(2 \leq N \leq 100)$ the number of Smurfs. Then a matrix A that consists of N strings follow: each string A_i has length N and consist only of zeros and ones. the i-th Smurf wins against j-th Smurf if and only if $A_{i,j} = 1$. it is guaranteed that $A_{i,j} = A_{j,i}$ and $A_{i,i} = 0$

Output

Output a single integer. the number of smurfs that have a chance of winning Smurfette heart.

Examples

standard input	standard output
4 0000 1010 1000 1110	1
4 0101 0010 1000 0110	4

Problem J. Smurfy Voyage

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Gold`

I hate bridges.

— *Grouchy Smurf*

Brainy Smurf considers himself the most intelligent Smurf in the village and an expert on everything, although his actual knowledge is questionable at best; often, his attempts to help in a given situation lead to even more problems. His vices aside, Brainy is a good, loyal Smurf who can be counted on when the need arises, and more than once – without thinking about it – ends up doing the right thing. Brainy Smurf is planning An trip to New York City. to do so, he must travel through the sea to get there. But, he can't go in one go since the trip will take a lot of time and he needs to rest. So, he decided to visit some islands on his way first and connect them with bridges as he moves along them (to help other Smurfs do the trip as well). the sea has N islands that he may want to visit. initially there is no bridges connecting the islands.

he is going off a trip that consists of M islands to visit in order, and during the plan he is going to add on-way bridges (if none exists). For example, let's suppose that he is currently on island number x and the next island to visit in his trip is city y. If there is no directed one-way road from x to y he will add it to the graph. he will also connect the island 1 (which is the island of the Smurfs) with the first island he visits using a one way bridge. (if they are not the same, and if there is no bridge going from the last island to the first island).

He also wants for the Smurfs to visit all islands starting from any island (since there are some beautiful islands along the way). So, after the trip ends. He will be satisfied if and only if he can travel from any city on his trip to any other city on his trip by using one or more one-way bridges.

Brainy Smurf told Hefty Smurf of his plan. So Hefty Smurf asked him the number of possible travel plan of M islands (order of islands there is so that you will be satisfied after the trip ends).

Note that the trip may contains the same island any number of times (it's also possible to have the same islands listed any number of times in a row in his trip).

Wanting to answer his question (and not wanting the Smurfs clobbering him with a club off screen). He asks for your help.

Find the number possible of travel plan modulo $10^9 + 7$.

Input

You are given a single integer T. The number of test cases. Then test cases follow: each test case consist of two integer N, M ($2 \leq N \leq 100$, $1 \leq M \leq 100$). the number of islands and the number of islands in the trip.

Output

For each test case output a single integer: number of travel plan modulo $10^9 + 7$.

Example

standard input	standard output
3 3 3 4 5 12 23	2 96 124616832

Problem K. Fishing Day

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Purple`

I hate fishing.

— *Grouchy Smurf*

Greedy is an exceptionally gluttonous Smurf. He has an exceptional interest in eating cakes and other pastry. Greedy usually cannot seem to help himself and he is often chased by Chef Smurf for stealing snacks and food. Chef Smurf is the Smurf village's chef. He knows dozens of recipes and cooks many dishes. He always wears his toque blanche (white chef's hat). Today Chef Smurf and Greedy Smurf decided to settle their differences. And cook a delicious meal for the villages, a meal so large that Greedy Smurf can't finish it on his own. So Chef Smurf asks Greedy Smurf to fetch him a large number of fish from the river. Jokey Smurf is the village prankster. as a prank he decided to put all the fishes in his buckets and will return them to the river later to surprise Greedy Smurf.

the river is of length N. Initially the river is empty. the river can be considered as a segment with integer coordinates from $[0, N-1]$.

There is also a special type of fish called Smurfy Fish that can lives in the river.

Those Smurfy Fishs always swim along the river, and their speed is 1 unit per second, and it's direction is one of two options (left or right).

The movement of a fish is defined as follows: let the position of the fish be $x \leq N-2$ on time t and it's direction is right –> then at the time $t+1$ it's position will be $x+1$, unless it's position is $N-1$ then the fish will change direction.

let the position of the fish be $x > 0$ on time t and it's direction is left <– then at the time $t+1$ it's position will be $x-1$, unless it's position is 0 then the fish will change direction.

Greedy Smurf notices that something is wrong with the fishes and decided to find out what. To do so, he must process Q queries.

You know of Jokey Smurf's prank. But you decided to help Greedy get his fishes. So, you will answer the queries for him.

Input

You are given two integers N, Q ($2 \leq N \leq 10^5$, $1 \leq Q \leq 10^5$). The length of the river, and the number of queries.

The i-th query is one of the following three types:

1. "L" t_i Y_i Z_i (Jokey adds Z_i fishes in the position from Y_i and their direction is to the left at time t_i). ($0 \leq Y_i \leq N-1$, $1 \leq t_i, Z_i \leq 10^8$).
2. "R" t_i Y_i Z_i (Jokey adds Z_i fishes in the position Y_i and their direction is to the right at time t_i). ($0 \leq Y_i \leq N-1$, $1 \leq t_i, Z_i \leq 10^8$).
3. "C" t_i L_i R_i (count the number of fishes in the range $[L_i, R_i]$ at time t_i). ($0 \leq L_i < R_i \leq N-1$, $1 \leq t_i \leq 10^8$).

it is guaranteed For all queries such that $i > 1$ that $t_{i-1} < t_i$.

Output

For each query of type "C" output one integer: The answer to the query.

Examples

standard input	standard output
10 3 R 1 2 1 L 2 5 1 C 3 4 5	2
5 4 L 1 1 2 R 2 4 2 C 3 2 4 C 5 2 4	2 4
10 10 C 1 3 8 L 2 1 2 R 3 7 3 C 4 1 5 C 5 0 6 L 6 2 3 R 7 3 5 C 8 2 9 R 9 7 1 L 10 6 1	0 0 2 10
14 15 R 1 6 4 C 2 0 4 R 6 3 8 L 9 0 8 L 11 1 3 R 18 8 7 L 19 3 3 C 22 5 7 C 25 2 5 C 30 4 7 R 31 10 7 C 39 1 10 C 41 4 10 C 47 1 12 R 49 8 4	0 0 15 22 33 22 40

Problem L. Hefty Smurf

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Pink`

I hate lifting.

— *Grouchy Smurf*

Hefty Smurf has incredible strength and often is seen doing a lot of the heavy work in the village. He also has a tattoo on his right arm (or sometimes both of his arms) of a red heart with an arrow through it. His favorite activity is lifting weights and doing other forms of exercise, and is often the one to kick Brainy out of the village whenever he is boasting. Hefty takes pride in being tough, sometimes doing it just for attention.

he has challenged himself to lift N barbell plates numbered from 1 to N, and the weight of the i-th plate is W_i.

Hefty Smurf noticed that he can lift any number of barbell plates if the following condition is held:

- For any digit from 0 to 9, the digit must **not occur in the weights more than twice.**

For example: Hefty Smurf can lift plates with weights $[11, 23, 2]$, but he can't lift $[10, 999]$ or $[99, 9, 10]$ because the digit 9 repeated 3 times.

Interested to test his limits. Hefty Smurf is wondering what is the maximum weight that he can lift, you want to know as well. So you decided to help him find it out.

Input

The first line contains the number of test cases T ($1 \leq T \leq 100$). A description of the test cases follows.

The first line of each test case contains one integer N ($1 \leq N \leq 100$) — the number of barbell plates in the gym

The second line contains N integers $W_1, W_2, .., W_N$ ($1 \leq W_i \leq 10^{16}$) — the wights of the barbell plates

It is guaranteed that the sum of N over all test cases does not exceed 100

Output

For each test case, output the maximum weight that Hefty Smurf can lift.

Example

standard input	standard output
3 3 11 23 2 1 222 3 97 98 99	36 0 195

Problem M. Fearsome Prankster

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Olive`

I hate pranks.

— *Grouchy Smurf*

Scaredy Smurf easily gets scared by anything whether it is a small insect or the noise of a storm. He is often teased by the other Smurfs because of this.

Today, Jokey Smurf is going to play at most M pranks on him. and he wants to scare him as much as possible. To help him measure how much he scared Scaredy Smurf he created an imaginary scoring system using a unit called "Jokey Points". So that each time he pranks Scaredy Smurf he can measure how effective his prank was by the number of Jokey Points he got from that prank. He has N kinds of pranks that he can try any number he wants as long as he does not go over M pranks in total. However, eventually, even Scaredy Smurf will grow tired of his pranks if he repeats them often. therefore, Jokey Smurf will get $V_i - D_i * (t_i - 1)$ Jokey Points if he tries to do the i-th prank for the t_i-th time.

Since you are interested in Jokey Smurf's scoring sytem, you decided to help him get the maximum amount of Jokey Points.

Input

You are given two integer N and M ($1 \leq N \leq 10^5$, $0 \leq M \leq 10^9$). the number different of prank Jokey Smurf has. And the maximum number of Pranks he can do. and then you are given two arrays V and D. Both of length N. which represent the V_i and D_i of the i-th kind of prank ($1 \leq V_i, D_i \leq 10^8$).

Output

Output a single integer the maximum amount of Jokey Points Jokey can have if he chooses his pranks optimally.

Example

standard input	standard output
3 5 5 7 9 2 4 6	27

Problem N. Dopey Sumation

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Orange`

"I hate sums."

— *Grouchy Smurf*

Dopey Smurf is the least intelligent among the Smurfs. Other Smurfs asked him to sum two number A and B. But, he couldn't answer. You feel bad Dopey Smurf. So you're going to calculate $A + B$ for him.

Input

You are given two number A,B ($1 \leq A, B \leq 10^5$).

Output

Print one integer: The answer to $A + B$.

Example

standard input	standard output
1 1	2