The International Collegiate Programming Contest
Sponsored by ICPC Foundation

The 2023 GirlsACPC Collegiate Programming Contest

(Contest Problems)

Online
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Problem A. Handles

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

After Ecpc Qualification *Alaa* was talking with the Coach *Nourhan*, *Gehad*, and *Fatma* they want to know what her handle means.

After *Alaa* explained it *Nourhan* suggests making it a problem, So You will give a String and want to convert the string to the next.

If you found the Capital word you should reverse the whole substring let's give an example "Alaa Handle"EwNacEsirNiaga.

- Ew will convert to We
- Nac will convert to Can
- and so on

you convert the string to We Can Rise Again, *Alaa* and her friends make the same technique, so we want to understand their handles, can you help us with this?

Input

one line contains a String $Handle$ ($1 \leq |Handle| \leq 10^3$) consisting of only English letters representing the Handle of one of *Alaa*'s friends.

Output

Output one integer the answer as explained

Examples

standard input	standard output
NwolzLliwEsirNiaga	Zlown Will Rise Again
EwNacEsirNiaga	We Can Rise Again

Problem B. Minimum Prime Number

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

Arwa loves prime numbers and knows that *Heba* loves Mathematics, so she wants to make the problem harder for *Heba*, she will give her an array of N elements and ask her to do Q commands on the array, and there are 2 types of commands. They are:

$MULTIPLY\ L\ R\ VAL$ - you have to multiply all numbers in the range of L to R [inclusively] to VAL, where $(1 \leq L \leq R \leq N)$.

$GET\ L\ R$ - output a line containing a single integer P(the minimum prime number) that there exists at least one integer A_i that $(A_i\%P! = 0)$ such that $(L \leq i \leq R)$.

As you see it is a hard problem for *Heba* to solve, can you help him?

Input

The first line contains two integers N $(1 \leq N \leq 10^6)$ and Q $(1 \leq Q \leq 10^6)$ N- the number of array elements and Q - the number of commands.

The next line contains the initial state of the array: $A_1, A_2, ..., A_N$ $(1 \leq A_i \leq 300)$, A_i is an integer.

The next Q lines contain one command in each of the following forms:

$MULTIPLY\ L\ R\ VAL$ $(1 \leq L \leq R \leq N, 2 \leq VAL \leq 300)$

$GET\ L\ R$ $(1 \leq L \leq R \leq N)$

There are no limitations on multiplication.

Output

for each query of the form $GET\ L\ R$, print the minimum prime number that isn't dividable by at least one number in the range between L and R [inclusively].

Example

standard input	standard output
5 5 2 2 2 2 2 GET 1 5 MULTIPLY 1 5 3 GET 1 5 MULTIPLY 1 4 5 GET 1 5	3 5 5

Problem C. Vacation

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

Reem went to her grandfather's farm on vacation. The farm has p trees of apples. Her grandfather asked her to collect apple crops from the trees. Every day *Reem* goes to the farm and collects all apples from the trees. On the first day, every tree has only one apple. Because of magic fertilizers, every tree grows very fast.

So that crop of every tree in i day will be equal all the crop of all trees in the previous day.

After the end of the vacation, *Reem*'s grandfather asked her about how many apples she has collected on all vacations from the farm. Unfortunately, *Reem* didn't remember how many apples she has collected but she remembered the duration of the vacation which is n days .can you help her?

If *Reem* gives you a set of N and P can you find the number of apples collected?

Input

The first line contains a number T ($1 \leq T \leq 100$), the number of test cases.

Each test case contains two numbers P and N ($2 \leq P \leq 10^3$), ($1 \leq N \leq 10^9$) number of trees in the farm and number of days.

Output

For each test case print the number of apples *Reem* has collected in all N days mod $10^9 + 7$.

Example

standard input	standard output
2 3 4 2 3	120 14

Problem D. Football Team

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

Mariam Asks *Nada* to form a football team.

Mariam has N friends, R friends are good at playing with the right foot, L friends are good at playing with the left foot, and the remaining are good at playing with both feet.

Mariam asked *Nada* to find the Maximum possible size of the football team, where an equal number of players use their right and left foot such that they want to try a new strategy, they want to distribute the half of players on the left side of the playground and the other half on the right half side, Can you help them determine the answer?

Input

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

Each test case consists of a single line containing three integers N, R and L ($0 \leq R, L \leq 10^{18}, R+L \leq N$) — the number of friends, Right-footed and the number of Left-footed

Output

Print a single integer — the Maximum number of players in the football team.

Example

standard input	standard output
5 2 1 1 2 2 0 4 2 2 3 1 0 5 2 1	2 0 4 2 4

Problem E. Camel Trip

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

Shimaa is well known as an ACPC Judge, but she hates the city and decides to go to live in a Bedouin tribe using camels for travel as no cars there. There are N villages in the desert and are given a sequence A of N integers where A_i is the coordinate of i_{th} village.

Shimaa needs to transport her goods by camel to arrive at village number N which is located at A_N

The Camel can store water on its hump at max 250 liters. people of each village i sells water for travelers by price P_i coin for liter.

The Camel starts the journey with L liters stored in its hump and loss water by the distance it crosses.

for example: if the camel cross distance equals 5 it loses 5 liters from stored water

When you arrive at any village, you *cannot* buy more liters of water than what a camel can drink to reach 250 liters

if the stored water in the camel's hump is 0 at any moment the camel dies

find the minimum number of coins *Shimaa* needed to travel from coordinate 0 to the coordinate of village N when the camel starts with L Liters of water.

Input

first line contain N and L $(2 \leq N \leq 2 * 10^3; 0 \leq L \leq 250)$ the number of villages , stored liters of water the camel start the journey by it

the second line has N integers $A_1 \leq A_2 \leq, ..., \leq A_N$ $(1 \leq A_i \leq 5 * 10^5)$

the third line has N integers $P_1, P_2, ..., P_N$ $(1 \leq P_i \leq 200)$the price of one liter of water in village i

Output

print the answer if the camel can arrive from 0 to A_N or print -1 otherwise

Examples

standard input	standard output
3 11 10 50 100 1 2 10	90
2 1 1 2 4 5	-1

Problem F. Mariam and bits

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

There is no time for a problem statement.

Mariam is given an array consisting of N integers and Mariam wants to calculate the summation of Xor in subarrays.

$$\sum_{i=L}^{R-1} \sum_{j=i+1}^{R} A_i \oplus A_j$$

where $\oplus$ means the bitwise exclusive OR

Mariam is given M queries. The i-th query is given as a two integer $L \leq R$. In this query, you need to calculate the above equation.

Mariam is so busy because she is a problem setter in *ACPC Girls*, Can you help her to find the answer?

Input

The first line contains two space-separated integers N ($1 \leq N \leq 2 \cdot 10^5$) and Q ($1 \leq Q \leq 2 \cdot 10^5$) — the number of elements in the array and the number of queries, correspondingly.

The second line contains N integers $A_1, A_2, ..., A_N$ ($0 \leq A_i \leq 10^9$)

Each of the following q lines contains two space-separated integers L_i and R_i ($1 \leq L_i \leq R_i \leq n$) — the i-th query.

Output

For each Query, output a single line containing the expected number of Answer modulo 998 244 353.

Example

standard input	standard output
10 3 3 1 4 1 5 9 2 6 5 3 1 7 2 5 3 4	118 19 5

Problem G. Hala and Average

Input file:	standard input
Output file:	standard output
Balloon Color:	Rose

One day Hala wanted to test the level of her nephew Arwa in the basics of mathematics. so Hala will challenge and gives her an array of N numbers and suddenly, she will hide M numbers from the array.

Now, Hala asks Arwa about the average of the hidden numbers and the sum if the average of the whole array is AVG_1 Arwa needs to know the answer but she could not.

can you help Arwa if she gives you the AVG_2 average of $N - M$ remaining numbers?

Input

The first line contains an integer T ($1 \leq T \leq 10^5$) — the number of test cases.

The second line contains 4 numbers N, M, AVG_1, AVG_2 ($1 \leq N, M, AVG_1, AVG_2 \leq 10^9, 1 \leq M < N$)

Output

for each test, output one integer the sum of the M hidden numbers

Example

standard input	standard output
4 4 3 10 6 7 4 10 5 5 4 4 6 10 6 9 8	34 55 14 58

Problem H. Friends

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

Hala and Her teammate Malak like to challenge each other in problem-solving. So Hala challenged Malak with a string problem. She gave him N strings of lower cases letters,She asked her to sort these strings in descending order depending on the frequencies of the smallest lexicographically characters.

For example, if she gave him strings 'abd', 'haha', 'abc' then they should be sorted like that 'haha', 'abc', 'abd' the string 'haha' has more a letters than other strings so it comes first. string 'abc' and 'abd' has an equal number of a and b letters but 'abc' has more c letters so it comes first. Because Malak is not good at strings she asked you to help her with this problem.

Input

First line contain a number N $(1 \leq N \leq 10^3)$,number strings.

The second line contains N strings of length no more than 10^3.

Output

Print N strings sorted in descending order

Example

standard input	standard output
3 abd haha abc	haha abc abd

Note

Note that in the state of tie, sort them lexicographically in descending order.

Problem I. Minimum Apples

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

Reem has a farm of apples, The farm has 2 rows of trees and each row has N tress, she is lazy and wants to divide the work of collecting apples into as many days as possible so she will give you everything about the farm and wants you to count the minimum number of apples she can collect in one day and take cares some rules:

- you should start in 1_{st} column and end N_{th} column but you can start and end in the first or second row or the informal way you want to go from $(1,1) or (2,1) to (1,N) or (2,N)$.
- you can go in two paths (left if you are on the right and right if you are on the left) or (go forward in the same row) or informal way if you are in (X,Y) you can go for $(X+1,Y),(X-1,Y) or (X,Y+1)$.

Reem asks you for the minimum number of apples she can collect on the first day and the minimum number of steps to do that, can you help her?

Input

The first line of the input contains T $(1 \leq T \leq 100)$ - T the number of the test cases.

The first line of each test contains one integer n $(1 \leq N \leq 2 \cdot 10^5)$ the number of the trees in each row.

The second line of each test case contains N integers: $A_1, A_2, ..., A_N$ $(1 \leq A_i \leq 10^9)$, A_i is the number of apples in a i_{th} tree in the first row.

The second line of each test case contains N integers: $B_1, B_2, ..., B_N$ $(1 \leq B_i \leq 10^9)$, B_i is the number of apples in a i_{th} tree in the second row.

It is guaranteed that the total sum of N in all tests does not exceed $2 \cdot 10^5$.

Output

For each test, print two integers the minimum number of apples and the minimum number of steps.

Example

standard input	standard output
2 5 1 2 3 4 5 5 4 3 2 1 3 12 1 15 1 14 23	12 5 28 2

Note

If you pass a tree you collect all apples in it.

Problem J. Find the path to home

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

There is a great forest in front of Alaa's home she usually goes walking and Explore the forest, but that time she goes walking and she loses the way to home, Alaa finds that there are N paths in front of her and each one of them consists of M points and each point has a monster or some packages of food

But she doesn't know the right path back home but fortunately, she stands now under a tree of food which contains infinite packages of food that she can take with her, She doesn't know how many packages of food she should take from the food tree to feed the monsters so that she can pass in peace, so she asked for your help can you help her?

You are given a $N * M$ array which represents the forest and the paths are the rows of the array (each path starts from the beginning of the row till the end) each point of each path $a_{i,j}$ is a monster if $a_{i,j}$ is strictly less than 0 and that monster will eat $a_{i,j}$ packages of food from Alaa if the packages with her are enough Otherwise it will eat Alaa, or several food packages that Alaa **must take with her if $a_{i,j}$ is greater than or equal 0**

Now Alaa wants to know the minimum number of food packages that she should take with her from the food tree so that she can go home from any path she chooses safely.

Input

You are given two integers N and M as $(1 \leq N, M \leq 10^3)$ then you are given N lines each line will contains M numbers as for the jth element in the ith row $(10^{-15} \leq a_{i,j} \leq 10^{15})$

Output

Output the minimum number of food packages that Alaa should take with her from the food tree so that she can go home from any path she chooses safely.

Example

standard input	standard output
3 3 -1 1 -1 2 1 -1 -2 -2 4	4

Problem K. Subtraction Algorithm

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

Heba has two variables X and Y and makes some operations in it, so consider the following algorithm performed with these two variables:

1. If $X = 0$ OR $Y = 0$, end the algorithm. Else, go to step 2;
2. If $X \geq 2 \cdot Y$, then set the value of X to $X - 2 \cdot Y$, and repeat step 1. Elst, go to step 3;
3. If $Y \geq 2 \cdot X$, then set the value of Y to $Y - 2 \cdot X$, and repeat step 1. Else, end the process.

You have to determine the values of X and Y after the process ends.

Input

The first line contains a single integer t ($1 \leq t \leq 10^4$), the number of test cases. Each test case consists of a single line containing two integers X and Y ($0 \leq X, Y \leq 10^{18}$).

Output

For each test case print two integers — the values of X and Y after end of the algorithm.

Example

standard input	standard output
4 1 4 2 4 1000 10001 12 5	1 0 2 0 0 1 0 1

Problem L. Too Late

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

Alaa and *Gehad* are friends .One day they were waiting for their friend and they were so bored until *Alaa* decided to play a game with *Gehad*.

Alaa knows that *Gehad* loves collecting even numbers so *Alaa* will give *Gehad* a group of numbers and if *Gehad* could collect all numbers she wins.

Alaa wants *Gehad* to win so she gave her a tool with this tool she could add any two numbers to each other and collect their sum.

Show if *Gehad* wins print "Win"else Print "Lose"without quotation marks.

Input

The first line of input will contain a single integer T ($1 \leq T \leq 10^4$), denoting the number of test cases.

Each test case consists of an integer N ($1 \leq N \leq 10^5$) - number of elements of the Group.

Elements of the Group A_i ($1 \leq A_i \leq 10^9$).

It is guaranteed that the sum of N over all test cases doesn't exceed $2 \cdot 10^5$.

Output

For each test case, Show if *Gehad* wins print "Win"else Print "Lose".

Example

standard input	standard output
3 8 578 746 295 884 198 655 503 868 6 718 498 727 338 43 768 2 369 712	Lose Win Lose

Problem M. Apples

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

Coach Yassmen wants to reward her students and she has N apples and wants to distribute all of them between her students so all have the same.

The coach is busy so she asks you to count how many different numbers of students the coach can invite and every student has at least K apples.

for example, if a coach has 8 apples and $K = 2$ then she can invite 1 students and takes 8 apples, can invite 2 students and everyone takes 4 apples or can invite 4 students and everyone takes 2 apples.

Input

The first line contains an integer T ($1 \leq T \leq 100$) — the number of test cases.

The first line of each test case contains two integer numbers N and K ($1 \leq K \leq N \leq 10^{12}$) – number of apple coach has.

Output

for each test, print one number of the required answer.

Example

standard input	standard output
3 8 2 5 2 19 1	3 1 2

Problem N. Help!!!

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

It's a matter of survival in the form of a little game, You and your enemy are given two unequal positive integer numbers on a whiteboard and You both move in turn.

Each turn one of you has to write on the board the value of subtraction of two different numbers on the board and the result must be a positive and new number, not equal to any number on the board, The one who doesn't have the chance to survive is the one who can't write on the board anymore.

You can always choose whether you will go first or second to write on the board for each test case to maximize your chance to survive as we want you to survive.

Input

The first line contains an integer T ($1 \leq T \leq 10^5$) — the number of test cases.

The first line of each test case contains two integers numbers N and K ($2 \leq N, K \leq 10^{18}$)

Output

for each test, Output "Go first"without double quotes if it is what makes you win, else output "Go second "without double quotes.

Example

standard input	standard output
3 9 7 2 20 3 1	Go first Go second Go first

Note

In the first example: 9 and 7 are given, you chose to go first so you write 2, then they write 5, then you write 3, they write 1, you write 4, they write 6, you write 8 and then they can't write any new positive integers anymore and you win!

9	7
You	Enemy
2	5
3	1
4	6
8	X

In the second example: 2 and 20 are given and if you chose to go first, you are over

2	20
You	Enemy
18	16
14	12
10	8
6	4
X	