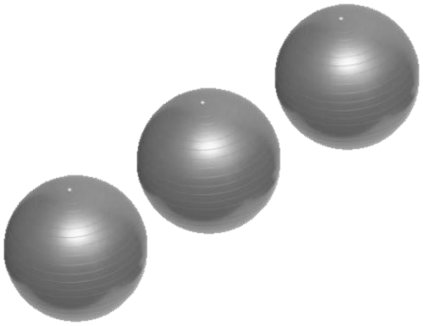
A. Arrangement of RGB Balls

Sohrab & Sepehr have n colorful balls, R of them are red, B of them are blue and G of them are green.



They want to arrange these balls in a single line. The only condition should be met is, any three consecutive balls, should not have two or more balls of the same color. It is your job to help them find out how many different ways these balls can be arranged, if all the same colored balls are indistinguishable.

Two colorful arrangements A and B are different, if there is a position i such that $Color(A_i) \neq Color(B_i)$, $(1 \leq i \leq n)$

Input (Standard Input)

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

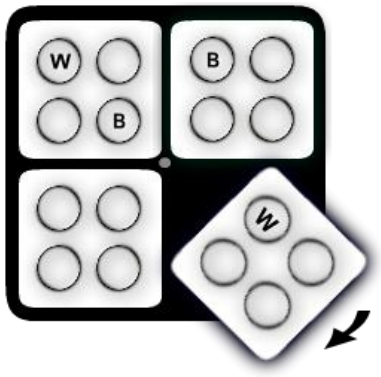
Each of next T lines have three integer numbers, R, G, B $(1 \leq R + G + B \leq 10^6)$, indicating number of red, green and blue balls, respectively.

Output (Standard Output)

For each test case print the number of different possible colorful lines that can be made.

Sample input	Sample output
4 **5 5 5** **3 3 2** **0 0 1** **3 4 5**	**6** **2** **1** **0**

B. Bentago



Pentago is a two-player abstract strategy game invented by Tomas Flodén which played on a 6×6 board. "Bentago" is similar to Pentago, but is played on a 4×4 board divided into four 2×2 sub-boards. Taking turns, the two players place a marble of their color (either black or white) onto an unoccupied space on the board and then rotate one of the sub-boards by 90 degrees either clockwise or anticlockwise. The white player starts the game. A player wins the game by having three of their marbles in a vertical, horizontal or diagonal alignment after the sub-board rotation in his move. If all 16 spaces on the board are occupied without a row of three being formed then the game is draw. Furthermore, if after some turn, both players have three marbles in a vertical, horizontal or diagonal alignment, the game is draw too.

Sohrab & Sepehr are playing Bentago and Soodabeh is watching their game. By having the current game state, she wants to know the result of the game. Note that Sohrab plays as white and Sepehr plays as black and both of them play optimally well.

Input (Standard Input)

The first line of input contains an integer T $(T \leq 50)$, indicating the number of test cases.

Each test case consists of five lines. Each of the first four lines contains four characters; these lines describe the position on the board. The fifth line of each test case is empty.

The position on the board is specified using characters "W" (white marble), "B" (black marble), and "." (free cell). You may assume that all positions in input are reachable in a real game in accordance with the described rules and all of given positions need at least one turn to terminate.

Output (Standard Output)

For each test case if white player wins the game, output "Sohrab". If black player wins, output "Sepehr", In the case of a draw, output "Draw". (quotes for clarification).

Sample Input	Sample Output
3 BWWB WBWB .B.. .W.. WBWB BWWB .W.. .... BBWB W..W WW.. B... 	Sohrab Sepehr Draw

C. Combination Lock

Sohrab & Sepehr found a combination lock. The lock has n rotating dials in which all of them have n adjacent sides. Integer numbers from 1 to n are written on dials respectively. Rotating one dial clockwise increases the number on dial. Numbers 1 and n are adjacent that is if the dial number is n and you increase it, the dial will set to number 1. Sohrab & Sepehr have invented a game with this lock and they are about to play it.

At first, Sohrab takes the lock and rotates dials in order to set them to any arbitrary combination. Sepehr has n turns to change the dial numbers. In i^{th} turn he can select one of dials that he didn't select before and rotates it exactly i times clockwise.

Sepehr is the winner of game if after his n turns, the combination lock has all of numbers between 1 to n, (*i.e.* formed a permutation of n numbers) otherwise Sohrab is the winner of the game.

You are given the combination lock which Sepehr has received. Determine who will be the winner of the game in case you know Sepehr plays optimally well.

Input (Standard Input)

The first line of input contains an integer T $(T \leq 100)$, indicating the number of test cases.

Each test contains an integer n $(n \leq 13)$ indicating number of dials on the lock, followed by n space separated integers, A_i $(1 \leq A_i \leq n)$ describing Sohrab's chosen combination.

Output (Standard Output)

For each test case output "Sohrab" or "Sepehr", corresponds to the winning side.

Sample Input	Sample Output
2 2 1 2 3 2 1 3	Sohrab Sepehr

D. Dreamer Land of Kashan

Sohrab & Sepehr are responsible for Kashan's taxi organization which has n taxi stations and m taxis. There exists exactly one road between any two taxi stations. Each of taxis has chosen their favorite road to drive in, that has not been chosen by any other taxi.

Sohrab & Sepehr soon realized that some stations are not accessible from each other. Now they want to solve this issue. After a while of consulting, these options are presented:

- Forcing some taxis to change their road by paying them. Each taxi requests some money for changing his favorite road to any other road.
- Employing some new taxis to drive in a specified road has determined by Sohrab & Sepehr. The cost of employing a new taxi is c and they are able to employ as many new taxis as they want.

Sohrab & Sepehr's primary concern is to find minimum total cost needed to solve this big problem. Also, if possible, they prefer to solve this problem with employing new taxis as a few as possible. As now, you are informed of their goal; your mission is to help them solve three problems. Firstly, how many new taxis must be employed? Secondly, how many old taxis must be forced to change their road? Ultimately, what is the minimum total cost?

Input (Standard Input)

The first line of input contains an integer T $(T <= 35)$ indicating the number of test cases.

Each test case starts with one line contains three integer numbers n, m and c $(2 \leq n \leq 10^4, 0 \leq m \leq 10^4, 1 \leq c \leq 10^5)$, the number of stations in the city, the number of taxis that have already employed and the cost of employing new taxis respectively.

Then the next m lines contains three integers a_i , b_i and r_i $(1 \leq a_i, b_i \leq n, a_i \neq b_i, 1 \leq r_i \leq 10^5)$, indicating that the i^{th} taxi has selected the road between stations a_i and b_i and he wants r_i unit of money to change his road. Stations are numbered in the range of 1 to n. It is guaranteed that no two taxis select the same road.

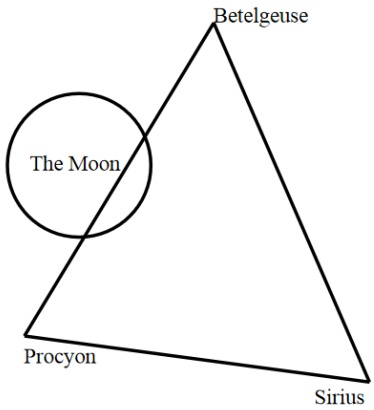
Output (Standard Output)

For each test case output three space separated numbers, representing the number of new taxis, the number of old taxis which should be forced to change their road and the total cost.

Sample Input	Sample Output
3 3 1 100 1 2 100 4 3 10 1 2 10 2 3 20 1 3 30 5 3 15 3 5 10 5 2 20 2 3 30	1 0 100 0 1 10 1 1 25

E. Era of Winter Triangle

Sohrab & Sepehr have decided to pursue their studies in astronomy. They have recently been interested in the Winter Triangle. The Winter Triangle is made of Sirius, Procyon and Betelgeuse which are three of the ten brightest objects observable from the Earth. They are planning to observe the Winter Triangle in the desserts around Kashan. They are wondering if the Moon has got any points in common with the Winter Triangle.



We model sky as a 2D plain. Stars are just like points in that plain. We have their coordinates, and also we model Moon as a circle.

Your job is to check if there is any common point between the Winter Triangle and the Moon or not.

Input (Standard Input)

The first line of the input contains an integer T $(T \leq 1000)$, indicating the number of test cases.

Each of the first three lines of test cases represents a pair of integers describing triangle's vertices.

The next line contains three integers X,Y,R. The point (X, Y) is the center of the Moon, and R is radius of the Moon.

All coordinate numbers in the input are less than or equal 1000 in absolute value and $(1 \leq R \leq 1000)$. Also it's guaranteed that no three vertices of the given triangles lie on a straight line.

Output (Standard Output)

For each test case print a single line containing "YES" if the Winter Triangle and the Moon have at least one common point; and "NO" otherwise.

Sample Input	Sample output
3 1 1 3 1 2 3 2 0 2 1 1 3 1 2 3 2 0 1 1 1 3 1 2 3 0 0 1	YES YES NO

F. Find The Problem!

Sohrab & Sepehr are problem-setters of 5^{th} Kashan programming contest. After they prepared their problems, the sponsor of event gives them two new raw problems. He asks them to add the two new problems to the problem set. Now you should solve one of those problems. Sohrab & Sepehr doesn't have any time to prepare the problem, so they explain the original one given by sponsor and you have to discover what it actually asks, then solve it!

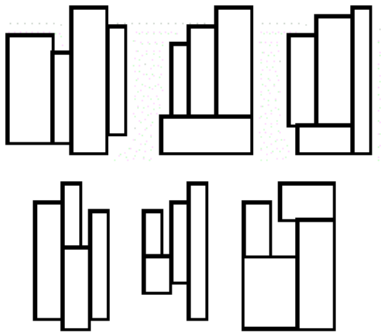


Fig1. A nostalgic figure from IOI95

Machine	Part	Code
R1	P1	C1
R1	P2	C2
R1	P3	C3
R1	P4	C4
R2	P1	C5
R2	P5	C6
R2	P6	C7
R2	P7	C8
R3	P5	C9

Fig1. Mysterious table

	P1	P2	P3	P4	P5	P6	P7
R1	C1	C2	C3	C4			
R2	C5				C6	C7	C8
R3					C9		

Fig2. Strange table

In this problem you are given a mysterious table and you should change it to a strange one! See the example to find out how to do it.

Input (Standard Input)

The first line of input contains an integer T $(T \leq 50)$ indicating the number of test cases.

First line of each test case contains an integer number N $(1 \leq N \leq 50)$ which is the number of data rows in the mysterious table. In each of next N lines there are three space-separated words $Machine_i$, $Part_i$, $Code_i$ representing saved data fields in the i^{th} row of mysterious table. All data in the table only consists of uppercase English letters and digits. Length of all words are less than or equal to 3 characters. It's guaranteed that in the given mysterious table all pairs $(Machine_i, Part_i)$ are distinct.

Output (Standard Output)

For each test case, output a strange table just like the sample input and output. There are two secret points you must consider:

- All data fields must contain exactly 3 characters and must be left justified. If the length of any field data is less than 3, you should add trailing space characters to it.
- Row and column names should appear in ascending lexicographical order.

Sample Input	Sample Output
2 9 R1 P1 C1 R1 P2 C2 R1 P3 C3 R1 P4 C4 R2 P1 C5 R2 P5 C6 R2 P6 C7 R2 P7 C8 R3 P5 C9 1 R1 P1 CCC	+---+---+---+---+---+---+---+---+ | |P1 |P2 |P3 |P4 |P5 |P6 |P7 | +---+---+---+---+---+---+---+---+ |R1 |C1 |C2 |C3 |C4 | | | | +---+---+---+---+---+---+---+---+ |R2 |C5 | | | |C6 |C7 |C8 | +---+---+---+---+---+---+---+---+ |R3 | | | | |C9 | | | +---+---+---+---+---+---+---+---+ +---+---+ | |P1 | +---+---+ |R1 |CCC| +---+---+

Hint

The lexicographical order of strings is the order we are all used to, the "dictionary" order. Such comparison is used in all modern programming languages to compare strings. Formally, a string p of length n is lexicographically less than string q of length m, if one of the two statements is correct:

- $n < m$, and p is the beginning (prefix) of string q (for example, "aba" is less than string "abaa"),
- $p_1 = q_1, p_2 = q_2, \ldots, p_{k-1} = q_{k-1}, p_k < q_k$ for some $k\,(1 \leq k \leq min(n, m))$, here characters in strings are numbered starting from 1.

G. General Sohrab & General Sepehr!

Sohrab & Sepehr are generals of the Kashan army. During daily PT formation, soldiers stand in a line, numbered from 1 to n (from left to right). In addition, each of them is either faced to right or left direction.

Sohrab & Sepehr give training commands to soldiers. Sohrab only likes to give "Sit Down" or "Stand Up" commands, and Sepehr only likes to give "Turn Around" command. Note that each general, commands to a specific soldier. So after some training commands, a number of soldiers are standing while some of them are sitting. Also some of them are in directions other than their initial direction.

Two soldiers are called "*Strong Soldier Pair*", if they meet all conditions below:

- Both soldiers are standing.
- Left soldier faced to right and right soldier faced to left.
- There is no standing soldier between them.

At some points, Sohrab & Sepehr want to know how many "*Strong Soldier Pair*" exist, in which both soldiers are between L and R (inclusive).

Your program should work with 3 types of queries:

1. Sohrab commands to soldier number X. (Toggle between sitting or standing position)
2. Sepehr commands to soldier number X. (Toggle between facing to right or facing to left)
3. How many "*Strong Soldier Pair*" lies between L and R? (inclusive).

Input (Standard Input)

The first line of input contains an integer T $(T \leq 15)$ indicating the number of test cases.

First line of each test case contains two integer numbers n and q $(2 \leq n \leq 10^5, 1 \leq \mathrm{q} \leq 10^5)$ indicating number of soldiers and number of queries respectively.

The next line contains a string S of length n that each character is either '<' or '>', indicating direction of soldiers. ('<' for left and '>' for right)

The i^{th} of the following q lines first contains an integer T_i $(1 \leq T_i \leq 3)$ indicating type of i^{th} query. If the i^{th} query is of type 1 or 2, then next follow one integer X_i $(1 \leq X_i \leq n)$. If the i^{th}

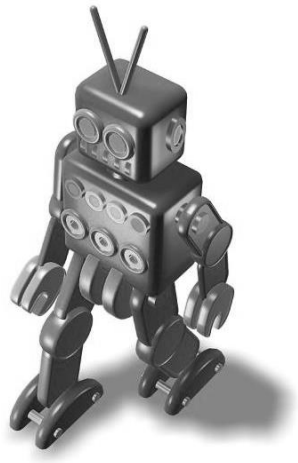
operation is of type 3, then next follow two integers L_i,R_i $1 \leq L_i \leq n-1, L_i+1 \leq R_i \leq n$). The numbers on the lines are separated by single spaces.

Output (Standard Output)

For each query of type 3, print a single line, the number of "*Strong Soldier Pairs*" that lies in the given segment. Print the answers to the queries in the order in which the queries go in the input.

Sample Input	Sample Output
2 6 10 ><><>< 3 1 6 1 2 3 1 6 2 3 3 1 6 3 2 6 3 2 5 1 2 3 1 6 3 3 4 4 4 >><< 3 1 4 1 2 1 3 3 1 4	3 2 2 1 0 2 0 1 1

H. Hungry Robot



Sohrab & Sepehr bought a new robot. The robot has a special program to eat fruits. To feed the robot, its owner should put some fruits in a row on the ground. Fruits are numbered from left to right starting from 1. Additionally the owner should choose and insert a *special digital counter* inside the back of robot's head. The digital counter only can count from 0 to $M - 1$ and in case of overflow, it starts from 0. (e.g. if $M = 8$ and digital counter has number 6, it will has 1 after counting 3 more times). In addition, the owner should set four integers L, R, X, Y before run the feeding program. Note that for technical reasons both of L and R should be a multiple of M. In robot's instruction manual there is an algorithm that shows how feeding program works. In the algorithm some of fruits called "*ILLEGAL*". A fruit is "*ILLEGAL*" if at least one of these conditions is true:

1. It is one of first L fruits.
2. It is one of last R fruits.
3. The number that *special digital counter* shows, when robot stands beside that fruit, is less than X.
4. The number that *special digital counter* shows, when robot stands beside that fruit, is greater than Y.

According to instruction manual of robot, the feeding algorithm works in this way:

1. Get the integer numbers L, R, X, Y from your owner.
2. Wait until your owner mounts a *special digital counter* on your head.
3. Set *special digital counter* to 0.
4. Stand beside of fruit number 1.
5. If the fruit that is in your side is not "*ILLEGAL*", then eat it.
6. If recently you ate an unripe fruit, turn off yourself immediately!
7. See the next step. If after the next step there is not any fruit in your side go to line 11.
8. Go one step forward.
9. Increase *special digital counter* one unit.
10. Go to line 5.
11. Increase *special digital counter* one unit.
12. If *special digital counter* shows 0 go to line 13, otherwise turn off yourself immediately!
13. Mission completed successfully.

Sohrab & Sepehr read the instruction manual. However, they didn't understand anything of it! Unfortunately, their robot is hungry!

They bring all fruits that exist at home and put them on the ground. Some of fruits are unripe and others are ripe.

Before run robot's feeding program they should choose a *special digital counter* with size M, and set four integer numbers L, R, X, Y for the robot. They would like know between any feasible values for M, L, R, X, Y, what is the maximum number of fruits that their robot can eat without turning off itself. They just know you as an expert that can help them out. You are given the number of fruits and the indexes of unripe fruits. Write a program that find maximum possible fruits, the robot can eat according to robot's feeding algorithm.

Input (Standard Input)

The first line of input contains an integer number T $(T \leq 50)$ indicating the number of test cases.

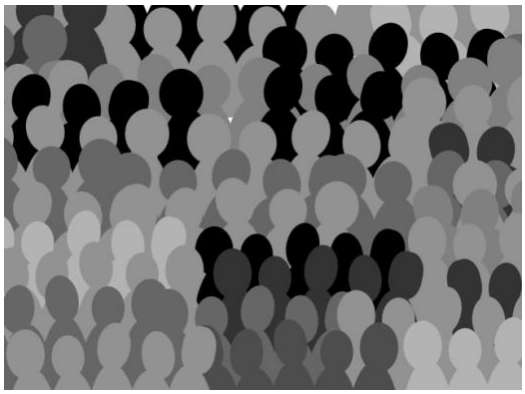
Each test case has two lines. First line of each test case contains two integer numbers n $(1 \leq n \leq 20000)$ and u $(0 \leq u \leq n)$ indicating number of fruits and number of unripe fruits. In the second line there are u space separated integers A_i $(1 \leq i \leq u,\ 1 \leq A_i \leq n)$ that indicates indexes of unripe fruits. Numbers in A is sorted in ascending order.

Output (Standard Output)

For each test case output the maximum number of fruits the robot can eat with correct configuration.

Sample Input	Sample Output
3 5 1 3 6 2 1 4 12 3 1 8 9	2 4 6

I. ICPC Team Selection



Sohrab & Sepehr are coaches of ACM/ICPC at the University of Kashan. This year, director of Tehran site allows them to send only one team to participate in the regional contest. This is an unfavorable situation, since there are too many good contestants at the university and only three of them will have a chance to be in the team.

Sohrab & Sepehr use some interesting policy to select team members. At the first they declare that every volunteer should have an account in TupCoder site. TupCoder is a site in which holds regular programming contests and each member have a rating considering his/her earned results. So every member of TupCoder has a unique overall ranking. (For members have equal ratings, there is some rules to break the tie). It is obvious that if a student has a better rank, he is probably being a better contestant for ICPC.

In addition Sohrab & Sepehr should not forget newbies because participating in regional contest is an excellent motivation for them to practice for contests ahead. Thus, Sohrab & Sepehr consider registration date of members on TupCoder too.

According to Sohrab & Sepehr's policy, every possible team should have three posts like a football team! A newbie, an experienced, and a wild member. Below is definition of every post:

1. Newbie member: This member should have worst TupCoder rank in team, and joined to TupCoder after other teammates.
2. Experienced member: he/she stands between newbie and wild in ranking and had joined TupCoder before other teammates.
3. Wild member: he/she should have best TupCoder rank in the team, but joined between newbie and experienced member.

Three students can form a team, if their team has a member for each of three above posts. All possible teams that can be formed are equiprobable.

You are given number of volunteers at the university of Kashan, their registration dates and rankings on TupCoder. For every student output probability that he/she may be selected as a kashan's team member.

Input (Standard Input)

The first line of input contains an integer T $(T \leq 30)$ indicating the number of test cases.

First line of each test case contains an integer number N $(3 \leq N \leq 5000)$ indicating number of volunteer students. $(i+1)^{th}$ line of each test contains D_i , R_i indicating registration date and ranking of student i. D_i is in $YYYY/MM/DD$ format and is a correct date between $1990/01/01$ to $2012/12/31$ and $1 \leq R_i \leq 100000$.

Output (Standard Output)

For each test case if Sohrab & Sepehr can't select any team with such rules print "Rules Should Be Changed!" in a line (quotes for clarification). Otherwise, print chances of every student to be chosen in Kashan's team in order that appeared in the input. The probabilities should be in form of fractions p_i/q_i such that greatest common divisor of p_i and q_i equals to 1. If a probability is equal to 0 print "0/1" and Print exactly one space between any two consecutive fractions.

Sample Input	Sample Output
3 3 2010/03/07 1500 2010/02/25 2500 2012/08/02 3500 5 2007/08/05 4 2007/07/11 5 2005/11/01 3 2006/05/31 2 2004/10/10 1 3 2006/05/31 123 2009/12/14 234 2008/07/19 345	1/1 1/1 1/1 1/2 1/2 1/1 1/1 0/1 Rules Should Be Changed!

J. Jokey Problem!

Sohrab & Sepehr are mayors of Kashan. They are calling agents of all NGO's in the Kashan to a very important meeting. In the meeting room, there is a round table that has M seats which are numbered from 0 to $M-1$ in clockwise order. (The table is circular so seats $M-1$ and 0 are adjacent as well).

One day before meeting, all groups are supposed to claim their desired seats for their agents. Each group selects one segment of adjacent seats. For this, they choose two seat numbers F_i and L_i, it means that they want all seats between F_i and L_i in clockwise order. (Inclusive). If $F_i = L_i$ it means they just want the seat F_i.

Sohrab & Sepehr know how many seats are available and which seats are selected by each group.

What is the maximum possible group can take part in the meeting?

Input (Standard Input)

The first line of input contains an integer T $(T \leq 25)$ indicating the number of test cases.

In the first line of each test case there is two integers N and M, the number of groups and number of seats respectively. $(1 \leq N \leq 10^5, 3 \leq M \leq 10^8)$

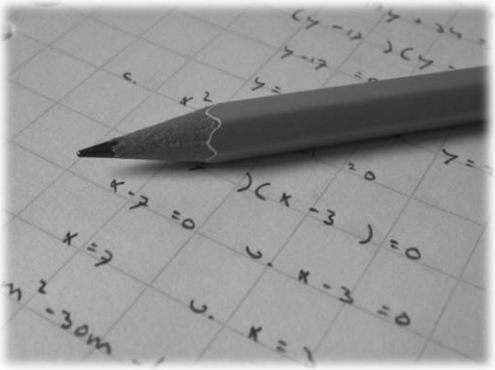
In the each of next N lines there is two numbers F_i and L_i that indicates first and last seats that group i selected (From F_i to L_i in clockwise order and inclusive). $(0 \leq F_i, L_i \leq M-1)$

Output (Standard Output)

For each test case print a single integer number which indicates maximum possible number of groups that can be invited to the meeting.

Sample Input	Sample Output
2 5 10 8 0 9 1 2 4 3 6 5 7 6 10 0 1 1 2 2 3 3 5 5 8 8 0	3 3

K. Killer Challenge



Sohrab has an integer sequence A of length n, he has to split the sequence into consecutive subsequences. Let R be the result of multiplication of sum of all subsequences. Furthermore, he has an integer number P which is $P = p_1 \times p_2 \times \dots \times p_n$. (p_i are different prime numbers)

He would like to maximize the value of $GCD(P, R)$. Furthermore because Sohrab likes addition more than multiplication, he wants to split original array to minimum number of subsequences. You should help him to achieve this goal.

Input (Standard Input)

The first line of input contains integer T ($T \leq 100$), indicating the number of test cases.
Each test case starts with a line containing two integer numbers, n $(1 \leq n \leq 100)$ which represents the number of elements of Sohrab's original sequence, and the number $(2 \leq P \leq 10^6)$.
The next line contains n space separated integer numbers representing the sequence A. $(1 \leq A_i \leq 10^6, 1 \leq i \leq n)$.

Output (Standard Output)

For each test case print two integer numbers separated by a single space, the first must be the maximum of $GCD(P, R)$ can be obtained by splitting the sequence and the next is the minimum number of cuts needed to obtain that GCD number.

Sample Input	Sample Output
3 2 2 1 2 3 10 9 5 3 4 6 7 1 4 5	2 1 5 2 6 1

Hint

The greatest common divisor of two non-negative integers a and b is such maximum positive integer k, that a is divisible by k without remainder and similarly, b is divisible by k without remainder. Let $GCD(a, b)$ represent the operation of calculating the greatest common divisor of numbers a and b.

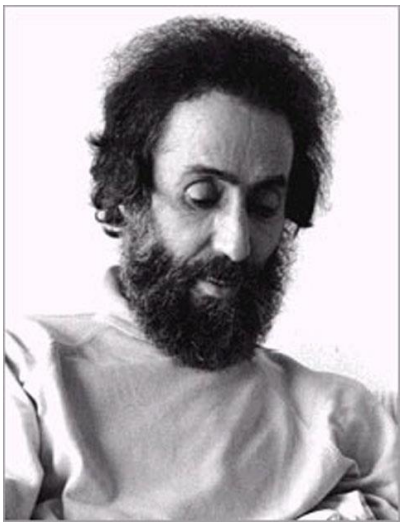
L. Lexicographically Minimal Poem

Sohrab Sepehri (Persian:سهراب سپهری) (October 7, 1928 - April 21, 1980) was a notable modern Persian poet and a painter.

He was born in Kashan in Isfahan province. He is considered to be one of the five most famous modern Persian (Iranian) poets who have practised "New Poetry" (a kind of poetry that often has neither meter nor rhyme). Other practitioners of this form were Nima Youshij, Ahmad Shamlou, Mehdi Akhavan-Sales, and Forough Farrokhzad.

His poetry is full of humanity and concern for human values. He loved nature and refers to it frequently.

Wikipedia



After all he was through, Sohrab eventually has become a great poet. Sepehr is now a professional cryptographer! They would like to have a little fun and play an interesting game. The game is based on substitution cipher method.

Substitution cipher is defined by a substitution key, assigning each letter of the alphabet to another letter (the assignment is a one-to-one mapping between lower-case English letters). The key is a 26-letter string mapping the i^{th} English letter to the key_i.

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧	↧
x	m	u	r	p	w	e	l	i	f	s	o	b	d	h	q	k	c	a	j	t	z	n	g	v	y

Fig1. An example of a substitution key.

For example, after encryption of the poem with the key in the figure above, all occurrences of character 'a' will be replaced with 'x' and the same goes for all other characters. The result of this process is called "*cipher-text*".

Sohrab selects one of his best poems, and encrypts it using substitution cipher with a key. He repeats this process with the same key for X times (the result of each stage of encryption is given as input to the next stage). Then he gives the result of the final stage of encryption to Sepehr; to make it harder for Sepehr to decrypt the ciphertext, Sohrab doesn't give him the number X (number of times he encrypted the poem). Sohrab gives Sepehr just the encryption key and the cipher-text.

Because Sepehr likes Sohrab's poems, he wants to decrypt his encrypted poems. Sepehr knows that he can decrypt the encrypted poems because he knows that the encryption method is so weak. Not knowing the X, he might find many different texts (candidate poems). There's a hint which Sohrab gives Sepehr: "*among all the candidate poems, one which is lexicographically minimal is my poem*".

As Sepehr knows you as a good programmer, he wants you to find Sohrab's poem.

Input (Standard Input)

The first line of contains an integer T $(T <= 25)$ indicating the number of test cases.

Each test-case contains three lines. In the first line of each test-case there is an integer number n $(n \leq 10^6)$.

Second line contains string S. String S has length n and only consists of lowercase English letters and representing encrypted poem.

In the Third line, the key of encryption is given as a string consists of 26 lowercase English letters. key has each of English letters exactly once.

Output (Standard Output)

For each test case print the poem of Sohrab in a single line.

Sample Input	Sample output
3 **7** **pumiuau** **xmurpwelifsobdhqkcajtzngvy** **29** **yzqjxynzysyrmttbjaymyrgyisvno** **zcdefghijkamnopqrstulwxybv** **24** **bezmnftheuecthepegucagtz** **cbafedihglkjonmrqputsxwvzy**	**acmicpc** **ahlekashanamroozegarambadnist** **beyondtheseathereisacity**

Hint

The lexicographic order of strings is the familiar to us "dictionary" order. Formally, the string p of length n is lexicographically smaller than string q of the same length, if $p_1 = q_1, p_2 = q_2, \dots, p_{k-1} = q_{k-1}, p_k < q_k$ for some i $(1 \leq i \leq n)$. Here characters in the strings are numbered from 1. The characters of the strings are compared in the alphabetic order.

Problem M. Marbles

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	256 megabytes

You have $2n$ marbles on a square grid. The marbles are colored in n different colors such that there are exactly 2 marbles of each color. The marbles are placed at the coordinates (1,0), (2,0), ..., ($2n$, 0).

Your task is to draw a path for each color that joins the two marbles of that color. Each path should be composed of vertical or horizontal line segments between grid points. No two paths can intersect or touch each other. No path may cross the $y = 0$ line. Each path can only touch the $y = 0$ line at the position of the two marbles it is connecting, so the first and last line segment of each path must be vertical.

Given an arrangement of marbles, return the minimum height of a solution, or return -1 if no solution exists. The height is defined as the difference between the highest and lowest Y-coordinates of the paths used.

An example: "`red red blue yellow blue yellow`".

One solution would be:

```
 +---+    +-----------+
 |   |    |           |
red red blue yellow blue yellow
                 |           |
                 +-----------+
```

The minimum height is 2 in this case.

Input

The first line of the test contains n ($1 \leq n \leq 500$), the number of different colors for the marbles. The next line contains a string of $2n$ words separated by spaces which correspond to the colors of the marbles, in order from left to right. Each color is a string of lower case letters ('a' ... 'z') no longer than 10 characters. There will be exactly n different colors and each color will appear exactly twice.

Output

Output one line containing the height of any optimal solution, or -1 if no solution exists.

Example

standard input	standard output
3 red red blue yellow blue yellow	2
3 red blue yellow red blue yellow	-1
3 red blue yellow blue yellow red	3
3 red red blue blue yellow yellow	1

Problem N. Lights

Input file:	`standard input`
Output file:	`standard output`
Time limit:	30 seconds
Memory limit:	256 megabytes

In a big, square room there are two point light sources: one is red and the other is green. There are also n circular pillars.

Light travels in straight lines and is absorbed by walls and pillars. The pillars therefore cast shadows: they do not let light through. There are places in the room where no light reaches (black), where only one of the two light sources reaches (red or green), and places where both lights reach (yellow). Compute the total area of each of the four colors in the room. Do not include the area of the pillars.

Input

Each test contains, in order:

- One line containing the coordinates x, y of the red light source.
- One line containing the coordinates x, y of the green light source.
- One line containing the number of pillars n.
- n lines describing the pillars. Each contains 3 numbers x, y, r. The pillar is a disk with the center (x, y) and radius r.

The room is the square described by $0 \leq x, y \leq 100$. Pillars, room walls and light sources are all disjoint, they do not overlap or touch.

All input numbers are integers, $0 \leq n \leq 50$, $0 \leq x, y \leq 100$, $1 \leq r \leq 49$.

Output

For each test case, output: black area, red area, green area, yellow area. Each area is a real number. Any answer with absolute or relative error of at most 10^{-5} will be accepted.

Example

standard input	standard output
5 50 95 50 1 50 50 10	0.7656121 1437.986 1437.986 6809.104