Problem A. A Game Abroad

Program:	`game.(cpp|java)`
Input:	`standard input`
Balloon Color:	`green`

Nourhéne Bziouech, a member of ACPC and TCPC System Administrators teams, studies Computer Science in the University of Passau in Germany. Because she is a social person, she has many German friends.

She always tries to let her friends know more about the Tunisian Culture. Once, they were very bored, so she decided to teach them a Tunisian card game.

The deck consists of 52. Each card can be uniquely identified by the pair consisting of its color and the number written on it. The color is one of 4 colors, numbered from 1 to 4. The number written on it can be one of the numbers from 1 to 13.

The game consists of her giving them 13 cards of the deck in some order. The numbers written on the cards are distinct. Then, they should order the cards such that for any 2 cards of different colors the one with lower color number should come first. And if 2 cards have the same color, the card whose number is lower should come first.

To order the cards, they can do only one kind of operation: swapping any 2 non-empty, non-overlapping groups of consecutive cards. The order of each group's cards is not changed during the operation. What is the minimum number of operations needed to order the cards according to the rules mentioned above?

Input

The input file contains T $(1 \leq T \leq 10^5)$ − the number of test cases.

The first line of each test case contains a permutation of cards P, $(1 \leq P_i \leq 13)$ − all cards' numbers are unique.

The second line of each test case contains the color of the cards C, $(1 \leq C_i \leq 4)$ − representing that the i_{th} card belongs to the color C_i.

Output

For each test case print a single integer in a single line − the minimum number of operations needed to sort the cards in the required order.

Examples

standard input	Standard Output
2 9 3 11 7 4 5 2 10 1 13 6 12 8 1 1 4 4 4 2 3 3 4 3 4 4 4 2 4 3 6 1 5 11 10 8 7 12 13 9 2 2 3 3 3 2 2 4 4 4 2 2 4	5 6

Problem B. Balloons Colors

Program:	`issac.(cpp|java)`
Input:	`standard input`
Balloon Color:	`blue`

During ACPC2016 judges had decided on balloon colors of all problems except for one problem. Nourhéne was working in the systems room near the judges and heard them arguing. So she challenged them to pick the balloons' colors according to the binary representation of the three components (R, G, B) of the contestants' t-shirts color.

Each color component is represented by a 3-decimal digit number from 000 to 255. After converting each component to an 8-digit binary number, they'll concatenate them, putting R then G then B. After that, they'll convert this binary string into a palindromic string in a minimum number of operations. An operation is flipping one bit from 0 to 1 or 1 to 0. Finally, they'll convert the resulting string into its RGB decimal representation again.

If there're several answers, print the one whose binary representation is lexicographically smallest.

Example of the conversion:

$\longrightarrow$ 101 205 255

In binary representation:

$\longrightarrow$ 01100101 11001101 11111111

Input

The input file contains T $(1 \leq T \leq 10^5)$ − the number of test cases.

Each test case consists of 3 numbers R, G, B $(0 \leq R, G, B \leq 255)$ − the contestants' t-shirts color components. Each of the 3 numbers will be given as a 3-digit decimal number. For example, 0 will be given as 000.

Output

For each test case print 3 space-separated numbers (R, G, B), each with 3 decimal places.

Example

standard input	Standard Output
3 155 048 232 022 058 173 255 255 162	019 000 200 020 024 040 069 255 162

Problem C.

Program:	`kepler.(cpp|java)`
Input:	`standard input`
Balloon Color:	`black`

When Nourhene first arrived in Germany and finished registering in her university, she had a short break. So she wanted to find a city to visit for M days. She started by checking the weather forecast during the M days in N cities. For each city she assigned 2 arrays.

The first represents the midday temperature. The second represents the night temperature.

For each city she would calculate the absolute of the difference between the highest midday temperature among all days and the lowest night temperature among all days.

The city she is going to choose is the city which has the largest absolute difference. In case of ties she chooses the city with the largest midday temperature. Still in a tie? she chooses the city which comes first in the input order.

Can you help Nourhene determine where she will spend her vacation?

Input

The input file contains T $(1 \leq T \leq 128)$ − the number of test cases.

The first line of each test case consists of 2 integers N and M $(1 \leq N \leq 10^5)$, $(1 \leq M \leq 10)$ − the number of cities and the number of days, respectively.

Then 3 * N lines follow, each 3 lines representing a city. The first line contains the city name S $(1 \leq |S| \leq 25)$ − the length of the city name. The city name consists of english alphabetical letters. The second line contains M numbers, the i_{th} number represents the midday temperature of the i_{th} day. The third line contains M numbers, the i_{th} number represents the night temperature of the i_{th} day.

Output

For each test case print a single word in a single line − the name of the city she should visit.

Examples

standard input	Standard Output
2 2 5 Cairo 3 -3 4 1 11 -8 -8 -1 -10 8 Giza 10 -2 0 -6 2 -12 -12 -10 -12 0 3 3 Darawa 6 6 -1 -6 9 1 Manial 9 -9 -11 1 7 5 Qanater -12 10 -5 -9 -3 5	Giza Qanater

Problem D.

Program:	`donald.(cpp|java)`
Input:	`standard input`
Balloon Color:	`yellow`

After Nourhene returned from ACPC 2015 back to Germany, she discovered she had an exam the next day of her arrival, so she had no choice except making up a method to pass the exam.

The exam was given as a true/false exam. Let X be the square root of the number of questions it has and Y the floor of X. She decided to split the questions into contagious groups, each one with Y questions, except the last group which may have less than Y questions (or possibly, exactly Y as well).

For example, if you have 11 questions, you will have 4 groups of questions:

- the first group will contain questions 1, 2 and 3.
- the second group will contain questions 4, 5 and 6.
- the third group will contain questions 7, 8 and 9.
- the fourth group will contain questions 10 and 11.

And she followed these rules in her answers:

- all questions in the same group should be solved using the same answer (true or false).
- you can not answer 2 consecutive groups using the same answer.

Nourhene wants to test if this method works, so she got an old exam's answer sheet to compare her method with the real answers. Out of all ways she can answer in abiding by the rules, can you help Nourhene by printing out the maximum she could get on the old exam?

Input

The input file contains T $(1 \leq T \leq 128)$ − the number of test cases.

Each test case consists of a single line contains a string S $(1 \leq |S| \leq 10^5)$, representing the answer sheet - $|S|$ represents the length of the string.

The string will be given in the following format: $n_1L_1n_2L_2 \ldots n_iL_i \ldots$ − $(n_i \leq 10^9)$, $L_i \in \{F, T\}$ − represents False and True in order. Each n_iL_i represents a group of n_i questions whose answers is L_i. Kindly, note that these groups are irrelevant to the groups in Nourhene's method, it's just a way to describe the answer sheet. And some groups, for no reason, could be empty.

Output

For each test case print a single integer in a single line − the maximum number of questions she could answer correctly using her method.

Examples

standard input	Standard Output
2 4F3T4F4T4F 7T6F3T4F4F	16 14

Problem E.

Program:	`space.(cpp|java)`
Input:	`standard input`
Balloon Color:	`purple`

Nourhene and Maha Ben Abdallah, members of the system administration team, were installing TCPC system, and while they were waiting for the system to be installed on the computers they got real bored, and they decided to play a game to pass the time. They found one of the switches catalogs in the contest hall.

Nourhene would pick a page and write down the words in a list, then she would give Maha a white sheet of width W and height H and ask her if she can fill the sheet using words from the list following these rules:

- H is the number of lines. W is the number of characters in each line.
- On a line, any two consecutive words must be separated by a single space. There must not be trailing spaces at the beginning or end of the line. And number of characters (including spaces) in a line must be equal to W.
- You can use a word multiple times.

If you were given the sizes of words in the list, and the width and height of the white sheet, can you find out how many ways Maha can fill the sheet using the list? Print out the number of ways modulo $10^9 + 7$.

Input

The input file contains T $(1 \leq T \leq 10^5)$ − the number of test cases.

Each test case consists of 2 lines, the first line consists of 3 integers N, H and W $(1 \leq N, H, W \leq 10^3)$ − the number of words, the height of the sheet and the width of the sheet. The second line contains N numbers N_i $(1 \leq N_i \leq 10^3)$.

Output

For each test case print a single number in a single line, the required answer modulo $10^9 + 7$.

Examples

standard input	Standard Output
3 4 1 5 1 3 3 1 5 3 3 1 3 1 1 3 3 1 5 1 2 3	16 1331 4

Problem F.

Program:	`pool.(cpp|java)`
Input:	`standard input`
Balloon Color:	`white`

On TCPC2016 day, teams were offered transportation to the contest hall, so some contestants formed groups and met at a certain location and started moving to the bus station, all groups at the same time. Whenever a group arrived at the bus station they would select the first available bus that can take all of them. If all available buses don't fit their group they will enter a new empty bus. If two groups arrived at the same time, the group with lower ID would get on the bus first.

Nourhene wants to measure the effectiveness of this method by finding the time each group took from arriving the station till its bus moved. Each bus moves under one of two conditions:

- When it is completely full.
- If all groups that can arrive already arrived.

Given the city map, gathering points, number of people in a group, the location of the bus station, and the capacity of a bus, can you calculate the total time each group took? You may assume that each street takes one unit of time to be traversed.

Input

The input file contains T ($1 \leq T \leq 256$) – the number of test cases.

The city map is represented as an undirectional graph with N nodes and M edges.

First line has 5 integers: N ($1 \leq N \leq 1000$), M ($0 \leq M \leq (N * (N-1)/2)$, G ($1 \leq G \leq 1000$), C ($1 \leq C \leq 1000$), S ($1 \leq S \leq N$) – number of nodes, number of edges, number of groups, bus capacity, and index of the location of the bus station, respectively.

M lines follow, each line with 2 integers, describing an edge between the 2 nodes. A line follows containing G integers, each representing the gathering points of the i_{th} group. A line follows containing G integers, each representing the number of people in the i_{th} group.

Output

G space-separated integers on one line, each representing the required answer. If a group can't reach the bus station, print -1 for this group.

Examples

standard input	Standard Output
1 5 6 4 5 2 3 2 4 1 5 2 3 1 2 1 4 2 5 1 2 4 2 2 5 4	0 0 0 0

Problem G.

Program:	`cubes.(cpp|java)`
Input:	`standard input`
Balloon Color:	`orange`

TCPC2016 contest has just started! Unfortunately, the printer that prints the accepted problems and balloon colors for the teams was down for half an hour at the beginning of the contest, but Nourhene and Maha were there to save the day and fix the printer,now there was another problem that needs to be solved, which is distributing the balloons for teams that got accepted solution during the time when the printer was down, and there was a lot of them!

Volunteers were waiting in the balloons room, but after 4 days of preparing for the contest they were exhausted, and each of them could walk for a certain distance only, the contest floor has tables, cables and blocked areas, and the lanes that the volunteers can move in turned out to be shaped like a tree, where its root is the balloon room where all the volunteers gathered.

Given the contest hall tree of N nodes, colors of required balloons in each Node, each volunteer's maximum level D that he can walk through the tree, and the balloon color that volunteer is carrying, Can you determine the maximum number of volunteers that can leave the balloon room and visit the nodes?

Input

The input file contains T $(1 \leq T \leq 512)$ − the number of test cases.

The first of each test cases consists of 2 integers N, M $(1 \leq N-1, M \leq 10^3)$ − the number of teams plus the balloon room located in node number 1 and the number of volunteers.

$N-1$ lines follow, each line consists of 2 integers u, v $(1 \leq u, v, u \neq v \leq N)$.

A line of $N-1$ integers follow, the i_{th} integer represents the balloon color of the i_{th} team, the first number represents the node number 2 and so on.

A line of M integers follow, the i_{th} integer represents the balloon color of the i_{th} volunteer.

$(1 \leq balloon color \leq 10^3)$

A line of M integers follow, the i_{th} integer represents the maximum distance d_i $(0 \leq d_i \leq 10^3)$ which the i_{th} volunteer can walk.

Output

For each test case print a single integer in a single line − the required answer.

Examples

standard input	Standard Output
1 5 4 3 1 5 1 4 1 3 2 2 5 5 2 4 2 1 2 3 3 2 2	2

Problem H.

Program:	`pizza.(cpp|java)`
Input:	`standard input`
Balloon Color:	`red`

While Nicole and Nourhene prepared for TCPC, Nourhene has already finished working with the system so she went to hang out with Nicole while she worked on the problems, she noticed that Nicole needs Nescafe in order for her brain to keeps operating.

She has noticed that her brain needs an amount of energy x in order for it to work effectively, and by time, this amount decreases to be zero, that's when she completely passes out.

She noticed that each cup of Nescafe increases her brain energy by y, and she definitely doesn't want her friend Nicole to pass out before finishing TCPC problems, given the original x and the current x, can you help Nourhene how many cups of Nescafe she needs to prepare for Nicole in order to restore the original x?

Input

The input file contains T $(1 \leq T \leq 2048)$ − the number of test cases.

Each test case consists of 1 line containing 3 integers X, x, y $(1 \leq X, x, y \leq 10^3)$ − the original x, the current x and the the amount of increment by a cup of Nescafe.

Output

For each test case print a single integer in a single line − the required answer.

Example

standard input	Standard Output
3 5 2 3 2 1 2 5 4 1	1 1 1

Problem I.

Program:	`darwin.(cpp|java)`
Input:	`standard input`
Balloon Color:	`gold`

While taking group photos for TCPC2015, Nourhene was organizing how the students will be located in the photo, each group photo would have N number of students, they would stand in a straight line, and in order for the photos to be perfect, Nourhene would sort the students in a certain way, she can do one of two operations, she can either swap 2 groups of students, or reverse one group. Since Nourhene doesn't know the names of all students, she would sometimes shout an index number and the student would reply with his/her name in that index at that time.

Given an array of length upto 10^6 that represents students numbers, and the following queries:

- Swap 2 non-overlapping continues groups.
- Reverse 1 group.
- Print the value in the given index.

Can you help Nourhene take the perfect photos and tag the students correctly?

Input

The input file contains T $(1 \leq T \leq 128)$ − the number of test cases.

The first of each test case contains a single integer N $(1 \leq N \leq 10^6)$ − the length of the array. The second line contains N space separated integers $(1 \leq N_i \leq 10^9)$. The third line contains a single integer q $(1 \leq q \leq 10^6)$ − the number of queries. Then q lines follow, each line represents a query. Queries format:

- S $start_1$ end_1 $start_2$ end_2 − swap 2 groups.
- R $start$ end − reverse a group.
- G idx print the value in this index.

It's guaranteed that all queries are correct and in boundaries.

Output

For each test case, print the answer of each query from the type G in a single line.

Example

standard input	Standard Output
1 5 3 2 1 6 7 9 S 1 3 4 5 R 2 4 R 1 2 R 3 4 G 2 G 1 G 5 G 4 G 3	6 2 1 3 7

Problem J.

Program:	`planet.(cpp|java)`
Input:	`standard input`
Balloon Color:	`pink`

Nourhene was printing the required name tags for TCPC, she was given a sheet of Width W and Height H and she was asked to print N square shaped tags, while maintaining the biggest size possible for them.

Given the Width and Height of the sheet, and N (number of the non-overlapping equal area squares), can you calculate the maximum area possible of a square that Nourhene can get?

Input

The input file contains T $(1 \leq T \leq 1024)$ − the number of test cases.

Each test case consists of a single line containing 3 integers N, W, H $(1 \leq N, W, H \leq 10^6)$.

Output

For each test case print a real number in a single line − the maximum area of the square rounded to exactly 4 decimal places.

Example

standard input	Standard Output
3 2 3 5 4 41 7 1 1 1	6.2500 49.0000 1.0000