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Problem set

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AJ

A

Treasure Hunter

Alice is a treasure hunter. He travels to various countries and collect treasures from there. Recently, he planned to visit one of most treasure collectable country "AJOBPURI".



The country consists of M cities and N one directional road. Using these roads one can travel from one city to another. Traveling from one city to another by the roads takes time and could be different for each road. In each city there are some gems which can be collected by entering into a city. Gems can be collected from a city only once. The country has only one entrance S and one exit E , which could be residing on the same or different cities.

But before going there, Alice wants to know that how much gems he can collect from visiting **AJOBPURI** and how much time it would take to collect those gems. Thus he seeks your help.

Input

Input starts with an integer T (≤ 100), denoting the number of test cases.

A2

Each case starts with four integers N ($1 \leq N \leq 18$), M ($0 \leq M \leq 200$), S ($1 \leq S \leq N$), E ($1 \leq E \leq N$). Then there will be a line containing N integers ($1 \leq X_i \leq 1000$), X_i denotes the number of gems in city i . Then there will be M lines each containing three integers u ($1 \leq u \leq N$), v ($1 \leq v \leq N$) and c ($1 \leq c \leq 1000$). u and v are cities and there is a road from u to v and c is the time required to reach from u to v . There can be multiple roads between two cities.

Output

For each case, print the case number first. Then print the maximum gem that can be collected followed by the minimum time required to do that. If it is impossible to exit the country after entering once, print "*Will be trapped!*" instead.(without quotes)

[See sample input output for more clarification]

Sample Input	Output for Sample Input
2 6 6 1 6 5 1 0 8 1 5 7 6 1 2 5 2 3 6 3 6 3 1 4 1 4 5 3 5 6 7 3 3 1 3 1 0 5 1 6 1 2 8 2 1 5 3 1 6	Case 1: 33 11 Case 2: Will be trapped!

B Palindrome Number

A **palindrome number** is a symmetrical number that remains the same when its digits are reversed. For example 1, 121 and 12321 are palindrome numbers but 1213 is not.

Your job is to find, how many **N** digits palindrome numbers are possible which are divisible by **X**. Here, 313 is a 3 digits palindrome number but 030 is not a valid 3 digits palindrome number, it is 2 digits number.

Input

There will be several lines in the input each containing two positive integers **N** and **X**, where $1 \leq N \leq 20$ and $1 \leq X \leq 10000$.

Output

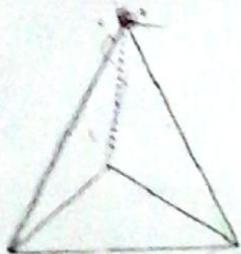
For each line in the input print the count of palindrome number of **N** digits which are divisible by **X**. The result may be very large. You should output the result%10000007.

Sample Input	Sample Output
2 3	3
3 12	6
1 1	10

C

Tyramid

You all know the myths about ancient Egyptian Pyramid. The ancient Egyptians built pyramids as tombs for the pharaohs and their queens. The pharaohs were buried in pyramids. They converted the dead bodies of their pharaohs and queens into mummies and put them inside the pyramids.



Now, what geometric shape a pyramid has? Well, in geometry, a pyramid is a polyhedron formed by connecting a polygonal base and a point, called the apex. Each base edge and apex form a triangle, called a lateral face. It is a conic solid with polygonal base. A pyramid with an n-sided base will have $n + 1$ vertices, $n + 1$ faces, and $2n$ edges.

A special type of pyramid having a trigonal base (i.e. $n=3$) is called Tyramid. (See Picture) The mayor of "triangular island" just died and the inhabitants of the island have built a Tyramid, as the island is also triangular. They have completed making the mummy of their mayor, but they don't know in which point the mummy should be positioned.

Your job is to help the people of triangular island. You are given all the information about the Tyramid, that is, the coordinate of the apex, A, and all three vertices of the base, V1, V2 & V3, and the desired point, D, where the inhabitants want to put the mummy, you need to determine if the mummy is inside, outside or on any surface of the Tyramid.

Input

The input contains several test cases. The first line of the input contains an integer T ($T < 100$), indicating the number of test cases. Each of the T test cases consists of five lines. First line describes the coordinate of the apex A. Following three lines

describe the three vertices of the base, and the last line describes the vertices of the desired point D.

Each coordinate description is a line containing three integers X, Y, Z indicating the coordinate of the vertex in space ($-10^3 \leq X \leq 10^3$, $-10^3 \leq Y \leq 10^3$, $-10^3 \leq Z \leq 10^3$).

Output

For each case, print the case number followed by one of the following status.
Print "TRIANGLE" if desired point is on the surface of Tyramid or print "OUTSIDE" if desired point is out of the Tyramid or print "INSIDE" if the desired point is inside the Tyramid. See sample output.

Sample Input	Sample Output
3  0 0 0 0 1 0 0 1 0 0 0 0 0 2 0 2 2 0	Case #1: TRIANGLE Case #2: OUTSIDE Case #3: INSIDE
0 0 0 0 1 0 0 1 0 0 0 0 0 2 0 2 2 -2	
0 0 0 0 1 0 0 1 0 0 0 0 0 2 0 2 2 2	

D

Cutter Master

Do you know the name of the **Cutter Master**? Please just copy these two words and search on Google, Yes, he is our national cricket hero Mustafizur Rahman.

Mustafizur Rahman is a Bangladeshi cricketer specialized as a left-arm medium fast bowler. He has taken the most wickets (13) in a debut One Day International series. He is the first player to win the 'Man of the Match' award on both Test as well as ODI debuts.

Rahman made his international cricket debut against Pakistan in the Twenty20 format in April 2015. Later that year, he played his first One Day International and Test matches against India and South Africa, respectively.

Before his international career, Rahman played in the 2014 Under-19 Cricket World Cup. He also represented Dhaka Dynamites in the 2015 Bangladesh Premier League and is currently representing Sunrisers Hyderabad in 2016 Indian Premier League.

Now your task is very simple. We will give you a bowling spell of Mustafizur Rahman, from this spell you just find the number of Hat trick, number of Maiden over and total run in his balling spell.

For example, an over is considered a maiden over if it contains six legal balls (no no-ball or wide) producing zero runs. Hat trick occurs when consecutive three ball get three wickets (can span over two over). Wide and No ball are considered as a single run and an extra ball is included in that over. For more clarity, the four over balling spell "000000W4WWW1N11000w0110000" contains

Hat trick: 1

Maiden over: 1

Total runs: 11

Input

First line of input will be an integer T ($T \leq 100$), the number of test cases. Each of the next T lines will contain a non empty string S ($6 \leq |S| \leq 100$). Where S is the balling spell and contains only digit (0-6), and alphabet ("W", "N", "w"). Small letter "w" indicate the wide ball, capital letter "W" indicate the wicket and capital letter "N" indicate the No ball.

Output

For each test case, print four line of the following format: "Case X:", "Hat trick: H", "Maiden over: M", "Total runs: R" where X is the number of test case, H is the total number of Hat trick, M is the total number of Maiden over and R is the total runs. Check sample input and output for more details.

Sample Input	Sample Output
2 <u>000000W4WWW1N11000w0110000</u> 000000W4WWW1N11000w1000000	Case 1: Hat trick: 1 Maiden over: 1 Total runs: 11 Case 2: Hat trick: 1 Maiden over: 2 Total runs: 10

E Directory Permission

You are familiar with directory structure already. Any directory or folder in your computer can be uniquely identified by the directory id and the id of its parent directory. However, when you login to a remote system, you are automatically taken to your "home directory" where you have permission to access.

You are now developing a system that will help us to determine the home directory for any user who tries to log in. In this problem, you will be given a list of directory descriptions. Each directory description includes the id of the directory, the id of its parent directory, and a list of user names who have access to this directory. The ID of the root directory is 0 and its parent ID is also 0. All the other directories are descendants of the root directory. It is guaranteed that the input will form a valid tree structure.

So, think of the system as a hierarchical structure of directories where users have access to specific folders in various levels. For each query user, you are to determine which directory should serve as their "home directory". A user's home directory is defined as the deepest directory in the hierarchical structure where the user has access to all of its subdirectories if any, or the directory itself where the user has access to. Check the following example:

Directory ID	Parent ID	Permitted Users
0	0	Admin
1	0	Rony, Tony
2	0	Rony

Here, the Admin's home directory is 0, because she can access the root node. Tony can only access 1, so 1 will be his home directory. On the other hand, Rony can access both 1 and 2, which are all the subdirectories of 0. So, 0 will be Rony's

home directory. Now if Raju wants to access the system, he will get a response of -1, since he has no access to any of the directories.

Input:

First line of input contains an integer T ($T < 100$), the number of test cases. For each test case, first you will be given two integers, n and q ($1 \leq n, q \leq 100$) where, n is the number of directories and q is the number of queries to process. Directories are numbered from 0 to $n-1$, 0 being the root node. The next n lines will contain description for n directories in the format of ID, PID, k followed by k usernames. Here, ID is the directory id, PID is its parent id, and k ($1 \leq k \leq 100$) is the number of users who have access to the directory. Each username will be single word composed of ASCII uppercase or lowercase letters only not exceeding 50 characters. After the directory descriptions, there will be q more lines, each containing a query username who wants to access the system. Each username will also maintain the constraints stated above.

Output:

For each test case, first print the case number starting from 1 and then print the directory ids of home directories for query usernames in the same order they appear in query, separated by single space. There should not be any space at the end of the lines. Check sample input and output for details.

Sample:

Sample Input	Sample Output
4 3 3 0 0 1 Admin 1 0 2 Rony Tony 2 0 1 Rony Admin Rony Tony	Case 1: 0 0 1 Case 2: -1 -1 -1 Case 3: 2 Case 4: 1 4 0 -1

1 3	
0 0 1 Admin	
Peter	
Paul	
Mary	
5 1	
0 0 1 Admin	
1 2 1 Jibon	
2 0 2 PulokJibon	
3 0 1 Tina	
4 1 1 Jibon	
Jibon	
12 4	
0 0 1 Admin	
1 0 1 Jerry	
2 1 2 Mina Tom	
3 1 2 Tom Jerry	
4 0 1 Diana	
5 4 1 Elsa	
6 4 1 Tesla	
7 4 2Kara Elsa	
8 0 1 Bobby	
9 8 1 Robin	
10 8 1Seema	
11 8 1 Tom	
Jerry	
Elsa	
Tom	
Shimul	

F

Bytelandian ID Cards

A famous software company named Elephant IT has been appointed to manufacture new ID cards for Bytelandian citizens. Since there are a lot of people, and everyone needs to have an ID number, Elephant IT came up with an excellent plan to generate these ID numbers. First, each citizen is given a number from 1 to n . Then the n^{th} citizen's ID number will be $(n + 7p)$ where p is the id number of $(n - 1)^{\text{th}}$ citizen provided that the ID number of first citizen is 1. However, the programmers working in Elephant IT are as bright as Elephants; they need your help to calculate the numbers for them for given citizens. Since the number can be very big, calculate the number modulo 10000007.

Input

First line of input will be an integer T ($T \leq 1000$), the number of test cases. Each of the next T lines will contain an integer n ($1 \leq n \leq 10^{16}$), the citizen number.

Output

For each test case, print a line of the following format: "Case X: Y", where X is the number of test case and Y is the ID card number of corresponding citizen. Check sample input and output for details.

Sample Input	Sample Output
4	Case 1: 1
1	Case 2: 9
2	Case 3: 66
3	Case 4: 7428778
100	

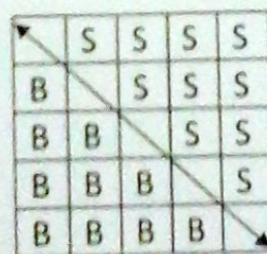
G

Kingdom Division

Mr. X is the king of an island. He has two daughters, a younger daughter named Shaly and an elder daughter named Baly. Now he wants to divide his Kingdom and all his wealth between Shaly and Baly equally. He called a mathematician and ordered him to divide his kingdom and wealth, but the mathematician gave him an advice to convert his kingdom to a square size and the King agreed to it. Now the main problem is with the wealth which may be not divided equally, but Shaly and Baly gave a good advice to their father. According to the daughters advice the king randomly hide part of his wealth in each cell of his square Kingdom. Now the mathematician's task is very easy. He divided the Kingdom diagonally and produced two equal kingdoms which is the upper part of the diagonal and the lower part of the diagonal. Now the King asked his daughter to select any part of the Kingdom. Shaly chose the upper part of the Kingdom and Baly got the lower part of the Kingdom. Now the King asked his daughters who got the maximum wealth? But his daughters are not able to answer this question. So please help Shaly and Baly figure out who got the maximum wealth.

For example the kingdom size is 5×5 . Each cell of the Kingdom contains some wealth which is denoted by a non-negative integer value. After dividing the Kingdom Shaly area is denoted by S and Baly area is denoted by B.

20	3	55	6	7
8	9	2	75	4
8	11	8	7	3
8	9	13	3	0
1	2	7	13	9



	3	55	6	7
8		2	75	4
8	11		7	3
8	9	13		0
1	2	7	13	

From this division of kingdom, Shaly got the maximum wealth.

Input

First line of input contains an integer T ($T \leq 100$), the number of test cases. For each test case, first you will be given N ($3 \leq N \leq 100$). Where N is the Kingdom size. Each of the next N lines contains N space separated integers forming the matrix. The values in the matrix lie in the range $[0, 1073741824]$.

Output

For each test case, print a line of the following format: "Case X: S" or "Case X: Both". Where X is the number of test case and S is the name of King Daughter who got the maximum wealth. If both of them are the same amount of wealth then print "Both" instead of S . Check sample input and output for details.

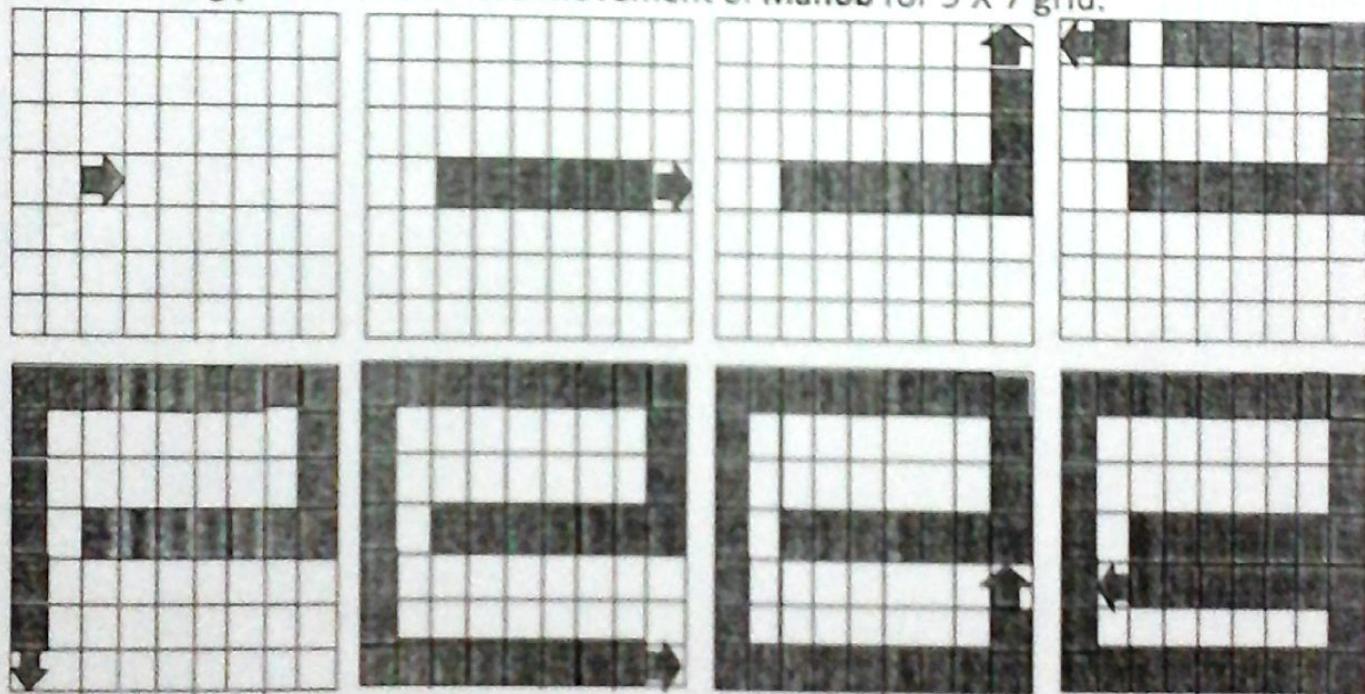
Sample Input	Sample Output
3 3 1 2 2 2 3 4 2 4 5 3 1 2 4 2 3 4 2 4 5 3 1 2 4 2 3 4 10 4 5	Case 1: Both Case 2: Shaly Case 3: Baly

H manob

Finally I and my team made a robot which name is **Manob**. We put some AI on it. We had a rectangular grid considering $W \times H$ square cells. If we placed **Manob** on one of the cell it should follow the following rules.

- Initially, **Manob** is facing east.
 - In each step it moves to the adjacent cell in the direction it currently faces.
 - It may not leave the grid.
 - It may not visit the same cell twice and also it may not reenter the same cell.
 - If a step forward does not break the above rules, **Manob** takes the step.
 - Otherwise, the robot rotates 90 degrees to the left and checks stepping forward still break the above rules. If not, **Manob** takes the step and continues.
 - If the rotation left did not help, it terminates the execution of this program.
 - We can also stop **Manob** manually at any moment.

The following picture shows the movement of Manob for 9×7 grid.



Now for testing purpose we write down a number of moves $m_1, m_2, m_3 \dots m_n$ meaning that **Manob** perform m_1 steps eastwards and then turn left, performed m_2 step northwards, turn left and so on. After performing last sequence of steps

Manob should stop. Your task is so simple. You have to print minimum area of grid in which the sequence of moves are possible. We are also not sure that the sequence of moves is valid or not. If it is not valid sequence of moves print -1 instead.

Input:

Input starts with a line having positive number T ($1 \leq T \leq 1000$) which indicates the number of test cases. Each test case consists of two lines. First one define the number of moves N ($1 \leq N \leq 1000$) and next line has N space separated numbers $M_1 M_2 M_3 \dots M_N$ where M ($1 \leq M \leq 1000$).

Output:

For each test case you should print the minimum area of the grid.

Sample Input	Sample Output
3 1 15 2 3 10 4 1 1 1 1	Case 1: 16 Case 2: 44 Case 3: -1

I

Pseudo code

Give the value of N and print the result of below function.

```
long long F(long long N)
{
    long long i,j, result =0;
    for(i=1;i<N;i++)
    {
        for(j=2;j<=i;j++)
        {
            if(i%j==0 && N%j==0) break;
        }
        if(j>i || i == 1)
        {
            result +=(i+N);
            result%=1000000007;
        }
    }
    return (result%1000000007);
}
```

Input

Input starts with an integer T (≤ 1000000), denoting the number of test cases.
Each case contains an integer N ($1 \leq N \leq 1 * 10^{14}$).

Output

For each case, output the case number and the desired value.

Sample Input	Sample Output
3	Case 1: 3
2	Case 2: 9
3	Case 3: 12
4	

J Baby game

Ratul is my younger brother. He is a very clever boy and from his childhood time he is very keen about mathematics. From the beginning, he liked to play with addition, multiplication and subtraction. Today he faced with a multiplication problem and spent all day to solve that. After giving up, he seeks help from me, but I am a busy man. Please help my younger brother solving his problem.

He wants to form N length valid string. The valid string is a string which meets the following constraints.

- All the index of the string contain only digit (0-9).
- Multiplications of its nonempty substrings are distinct.
- Single digit substrings consider as a result of multiplication.

For example "238" is a valid string, because it has six nonempty substrings ("2", "3", "8", "23", "38", "238") and their multiplication result ("2", "3", "8", "6", "24", "48") are also distinct.

Another example "123" is not a valid string because it has six nonempty contiguous substrings ("1", "2", "3", "12", "23", "123") and their multiplication result ("1", "2", "3", "2", "6", "6") are not distinct.

Your task is to help my brother calculating the number of valid string exists for length N.

Input

First line of input will be an integer T ($T \leq 10000$), the number of test cases. Each of the next T lines will contain an integer N ($1 \leq N \leq 1000000$). Where N is the string length.



Output

For each test case, print a line of the following format: "Case X: Y", where X is the number of test case and Y is the total number of N length valid string. Check sample input and output for more details.

Sample Input	Sample Output
2 1 2	Case 1: 10 Case 2: 56