A. OO’s Sequence

OO has got a array A of size n ,defined a function f(l,r) represent the number of i (l<=i<=r) , that there's no j(l<=j<=r,j<>i) satisfy a_i mod a_j=0,now OO want to know

$$\sum_{i=1}^{n}\sum_{j=i}^{n} f(i,j)\ mod\ (\ 10^9+7\ ).$$

Input

There are multiple test cases. Please process till EOF.
In each test case:
First line: an integer n(n<=10^5) indicating the size of array
Second line:contain n numbers a_i(0<a_i<=10000)

Output

For each tests: ouput a line contain a number ans.

Sample Input

```
5
1 2 3 4 5
```

Sample Output

```
23
```

B. Assignment

Tom owns a company and he is the boss. There are n staffs which are numbered from 1 to n in this company, and every staff has a ability. Now, Tom is going to assign a special task to some staffs who were in the same group. In a group, the difference of the ability of any two staff is less than k, and their numbers are continuous. Tom want to know the number of groups like this.

Input

In the first line a number T indicates the number of test cases. Then for each case the first line contain 2 numbers n, k (1<=n<=100000, 0<k<=10^9),indicate the company has n persons, k means the maximum difference between abilities of staff in a group is less than k. The second line contains n integers:a[1],a[2],…,a[n](0<=a[i]<=10^9),indicate the i-th staff's ability.

Output

For each test，output the number of groups.

Sample Input

```
2
4 2
3 1 2 4
10 5
0 3 4 5 2 1 6 7 8 9
```

Sample Output

```
5
28
```

C. Bombing plan

Kingdom Y is in the war with kingdom X. Kingdom X consists of N cities,there are N-1 bidirectional roads which are all 1 long， each of them connect a pair of cities,the N cities are all connect by the N-1 bidirectional.People can travel through the roads.

Now kingdom Y is going to bomb kingdom X. Every city of kingdom X has its own value W. If city i was to be bombed, then all the cities that lie within the distance W(i) from city i would be destroyed as well. The king of kingdom Y wants to know the minimum bombing time that can destroy all the cities in kingdom X. Could you help him?

Input

There are multiple test cases. Please process till EOF.
In each test case:
First line: an integer n(n<=10^5) indicating the number of city
Second line:contain n numbers w[i](0<=w[i]<=100) ,indicating that the value of city[i],
Next n - 1 lines: each contains two numbers ui and vi, (1 ≤ ui,vi<=n), indicates that there’s one road connecting city ui and vi.

Output

For each case,output one number, denotes the minimum number of bombing times.

Sample Input

```
5
1 1 1 1 1
1 2
2 3
3 4
4 5
```

Sample Output

```
2
```

D. Candy Distribution

WY has n kind of candy, number 1-N, The i-th kind of candy has ai. WY would like to give some of the candy to his teammate Ecry and lasten. To be fair, he hopes that Ecry’s candies are as many as lasten's in the end. How many kinds of methods are there?

Input

The first line contains an integer T<=11 which is the number of test cases.
Then T cases follow. Each case contains two lines. The first line contains one integer n(1<=n<=200). The second line contains n integers ai(1<=ai<=200)

Output

For each test case, output a single integer (the number of ways that WY can distribute candies to his teammates, modulo 10^9+7) in a single line.

Sample Input

```
2
1
2
2
1 2
```

Sample Output

```
2
4
```

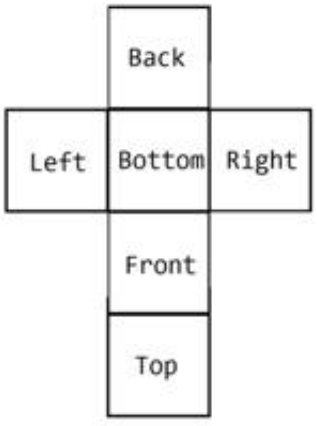
E. Pocket Cube

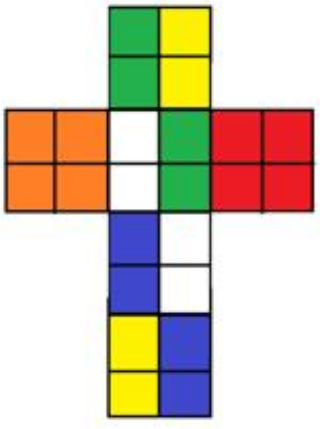
Pocket Cube is the 2×2×2 equivalent of a Rubik's Cube(3×3×3). The cube consists of 8 pieces, all corners. (from wiki)

It was a Pocket Cube. Unfortunately, the Cube fell to the ground and broke. It took you some time to explore the construction of the Cube. Then you assembled the Pocket Cube. Unfortunately, you didn't assembled it in the right way. So here is the question. You want to know whether it can return to the right position.

The right position means four blocks in each face has the same color. You can only rotate the Cube to return it to the right position.

A Cube is given in its layout.





The right position rotates in red face clockwisely.
You can get more details from input case.
w represents white , y represents yellow , o represents orange , r represents red , g represents green , b represents blue. In the right position, white and yellow , orange and red , green and blue are in the opposite face.

Input

The first line of input contains only one integer T(<=10000), the number of test cases.
Each case contains a Pocket Cube described above. After each case , there is a blacnk line. **It guarantees that the corners of the Cube is right.**

Output

Each case contains only one line. Each line should start with “Case #i: ”,with i implying the case number, followed by “YES” or “NO”,”YES” means you can return it to the right position, otherwise “NO”.

Sample Input

```
2
    g y
    g y
o o w g r r
o o w g r r
    b w
    b w
    y b
    y b

    r w
    g b
b y o w o r
y g y o g b
    r w
    o y
    b r
    w g
```

Sample Output

```
Case #1: YES
Case #2: NO
```

F. Tree chain problem

Coco has a tree, whose vertices are conveniently labeled by 1,2,…,n.
There are m chain on the tree, Each chain has a certain weight. Coco would like to pick out some chains any two of which do not share common vertices.
Find out the maximum sum of the weight Coco can pick

Input

The input consists of several test cases. The first line of input gives the number of test cases T (T<=10).
For each tests:
First line two positive integers n, m.(1<=n,m<=100000)
The following (n - 1) lines contain 2 integers ai bi denoting an edge between vertices ai and bi (1≤ai,bi≤n),
Next m lines each three numbers u, v and val（1≤u，v≤n，0<val<1000）, represent the two end points and the weight of a tree chain.

Output

For each tests:
A single integer, the maximum number of paths.

Sample Input

```
1
7 3
1 2
1 3
2 4
2 5
3 6
3 7
2 3 4
4 5 3
6 7 3
```

Sample Output

```
6
```

G. Tricks Device

Innocent Wu follows Dumb Zhang into a ancient tomb. Innocent Wu's at the entrance of the tomb while Dumb Zhang's at the end of it. The tomb is made up of many chambers, the total number is N. And there are M channels connecting the chambers. Innocent Wu wants to catch up Dumb Zhang to find out the answers of some questions, however, it's Dumb Zhang's intention to keep Innocent Wu in the dark, to do which he has to stop Innocent Wu from getting him. Only via the original shortest ways from the entrance to the end of the tomb costs the minimum time, and that's the only chance Innocent Wu can catch Dumb Zhang.
Unfortunately, Dumb Zhang masters the art of becoming invisible(奇门遁甲) and tricks devices of this tomb, he can cut off the connections between chambers by using them. Dumb Zhang wanders how many channels at least he has to cut to stop Innocent Wu. And Innocent Wu wants to know after how many channels at most Dumb Zhang cut off Innocent Wu still has the chance to catch Dumb Zhang.

Input

There are multiple test cases. Please process till EOF.
For each case,the first line must includes two integers, N(<=2000), M(<=60000). N is the total number of the chambers, M is the total number of the channels.
In the following M lines, every line must includes three numbers, and use ai、bi、li as channel i connecting chamber ai and bi(1<=ai,bi<=n), it costs li(0<li<=100) minute to pass channel i.
The entrance of the tomb is at the chamber one, the end of tomb is at the chamber N.

Output

Output two numbers to stand for the answers of Dumb Zhang and Innocent Wu's questions.

Sample Input

```
8 9
1 2 2
2 3 2
2 4 1
3 5 3
4 5 4
5 8 1
1 6 2
6 7 5
7 8 1
```

Sample Output

```
2 6
```

H. Unstable

Rasen had lost in labyrinth for 20 years. In a normal day, he found a bright screen. There were 4 points labeled by ‘A’ , ‘B’ , ‘C’ , ‘D’, and rasen could drag these point. And two points ‘E’ , ‘F’ moved. Rasen found that ‘E’ is the middle point of ‘A’ and ‘B’, and ‘F’ is the middle point of ‘C’ and ‘D’. Near the screen there was a marble slab.There were a list of the distance of AB , BC , CD , DA and EF. Rasen also found that the distance of these edge of the points in screen showed at the same time he drop the points. He wanted to know what will happen if the distances in screen are same with the number in slab.

Input

The first line of input contains only one integer T(<=50000), the number of test cases.
Each case contains five float number, indicating the distance of AB , BC , CD , DA , EF.
（0<=distance<=10000）

Output

For each test, first print a line “Case #i:”(without quotes),with i implying the case number, then output the coordinates of A,B,C,D four points. Answer will be considered as correct if the length got from your output (the spj will use double to get the point, and the distance from two points will calculate in the way of sqrt((x1-x2)^2 +(y1-y2)^2)) and the length given is less than 10^{-4}.
(It guarantees that there exists a solution. If there are many solutions, output any one of them.)

Sample Input

```
1
1.000000 1.000000 1.000000 1.000000 1.000000
```

Sample Output

```
Case #1:
0.000000 0.000000
1.000000 0.000000
1.000000 1.000000
0.000000 1.000000
```

I. Annoying problem

Coco has a tree, whose nodes are conveniently labeled by 1,2,…,n, which has n-1 edge，each edge has a weight. An existing set S is initially empty.
Now there are two kinds of operation:

1 x： If the node x is not in the set S, add node x to the set S
2 x： If the node x is in the set S,delete node x from the set S

Now there is a annoying problem: In order to select a set of edges from tree after each operation which makes any two nodes in set S connected. What is the minimum of the sum of the selected edges' weight ?

Input

one integer number T is described in the first line represents the group number of testcases.(T<=10)
For each test:
The first line has 2 integer number n,q(0<n,q<=100000) describe the number of nodes and the number of operations.
The following n-1 lines each line has 3 integer number u,v,w describe that between node u and node v has an edge weight w.(1<=u,v<=n,1<=w<=100)
The following q lines each line has 2 integer number x,y describe one operation.（x=1 or 2,1<=y<=n）

Output

Each testcase outputs a line of "Case #x:" , x starts from 1.
The next q line represents the answer to each operation.

Sample Input

```
1
6 5
1 2 2
1 5 2
5 6 2
2 4 2
2 3 2
1 5
1 3
1 4
1 2
2 5
```

Sample Output

```
Case #1:
0
6
8
8
4
```

J. Y sequence

Yellowstar likes integers so much that he listed all positive integers in ascending order,but he hates those numbers which can be written as a^b (a, b are positive integers,2<=b<=r),so he removed them all.Yellowstar calls the sequence that formed by the rest integers“Y sequence”.When r=3,The first few items of it are：
2,3,5,6,7,10.....
Given positive integers n and r，you should output Y(n)(the n-th number of Y sequence.It is obvious that Y(1)=2 whatever r is).

Input

The first line of the input contains a single number T:the number of test cases.
Then T cases follow, each contains two positive integer n and r described above.
n<=2*10^18,2<=r<=62,T<=30000.

Output

For each case,output Y(n).

Sample Input

```
2
10 2
10 3
```

Sample Output

```
13
14
```

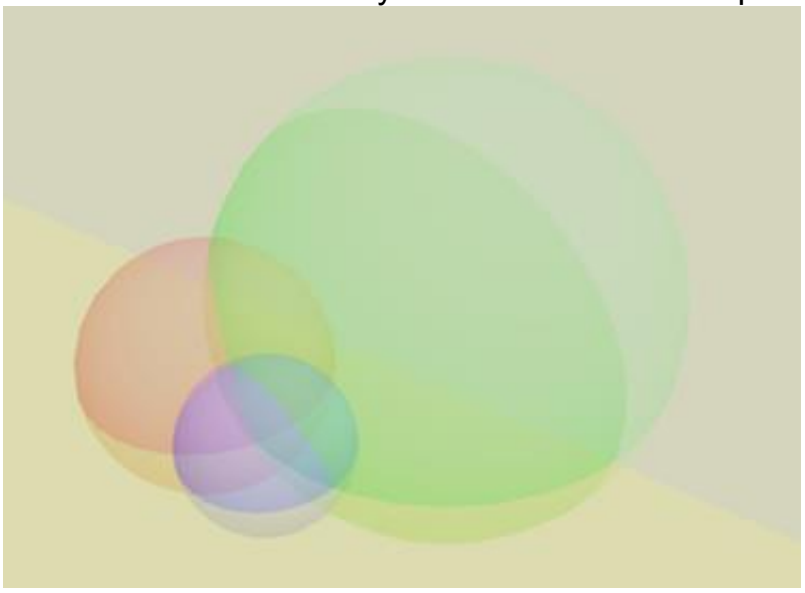
K. Solid Geometry Homework

Yellowstar is studying solid geometry recently,and today's homework is about the space,plane and sphere.So he draw many planes and spheres in the draft paper.These infinite planes and (the surface of)spheres divides the whole drawing space(which can be considered as a infinite 3D-space) into many disjoint regions.Planes and spheres forms the borders of these regions,and they don't belong to any regions.

Then he comes up with a crazy idea:color the whole space with crayons.He wants that one region has only one color,and two adjacent regions should be colored differently ("adjacent" means the area of two regions' common borders is greater than zero).Unfortunately,he has only two crayons:a yellow one and a red one.

Yellowstar likes yellow very much,so he gives some coordinates.The regions these points belong to should be colored yellow.

Given positions of all the planes and spheres and the coordinates mentioned above.You should determine:Is there a way to satisfy all the requests?Yellowstar also gives some other coordinates.He wants to know which color they will be while all the requests are satisfied.



Input

The first line contains an integer T,denoting the number of the test cases.

For each test case, the first line contains 4 integers m,n,p and q, denoting the number of planes,spheres,points and queries.

Then m lines follows,each containing four integers a,b,c and d,denoting the linear equation(ax+by+cz+d=0) of this plane.|a|+|b|+|c|>0.

Then n lines follows,each containing four integers x,y,z and r,denoting the center coordinate(x,y,z) and radius of this sphere.

Then p lines follows, each containing three integers x,y,z,denoting point(x,y,z),the region it belongs to should be colored yellow.

Next q lines are queries.Each contains three integers x,y,z-the coordinate of this point.You need to output which color it will be.

T<=30,0<=m<=100,0<=n<=10,0<=p<=200,1<=q<=2000,|all given numbers|<=10^6，any two planes or spheres aren't coincidence.No point lies on given planes or spheres.

There is a blank line before each case.

Output

For each case，if there is no such a coloring way to color the whole space and meet all the requests,print"Impossible".

Otherwise，for each query，print a line.If the color of this point can be certainly inferred,print it('Y' for yellow or 'R' for red)；if not(both are possible),print"Both".
Print a blank line between adjacent cases.

Sample Input

```
3

1 1 1 2
0 0 1 0
0 0 0 2
0 0 1
0 0 -1
0 0 4

1 1 2 1
0 0 1 0
0 0 0 2
0 0 1
0 0 -1
0 0 4

1 1 0 2
0 0 1 0
0 0 0 2
0 0 4
0 0 -1
```

Sample Output

```
R
R

Impossible

Both
Both
```

L. Circles Game

There are n circles on a infinitely large table.With every two circle, either one contains another or isolates from the other.They are never crossed nor tangent.
Alice and Bob are playing a game concerning these circles.They take turn to play,Alice goes first:
1、Pick out a certain circle A,then delete A and every circle that is inside of A.
2、Failling to find a deletable circle within one round will lost the game.
Now,Alice and Bob are both smart guys,who will win the game,output the winner's name.

Input

The first line include a positive integer T<=20,indicating the total group number of the statistic.
As for the following T groups of statistic,the first line of every group must include a positive integer n to define the number of the circles.
And the following lines,each line consists of 3 integers x,y and r,stating the coordinate of the circle center and radius of the circle respectively.
n≤20000，|x|≤20000，|y|≤20000，r≤20000。

Output

If Alice won,output “Alice”,else output “Bob”

Sample Input

```
2
1
0 0 1
6
-100 0 90
-50 0 1
-20 0 1
100 0 90
47 0 1
23 0 1
```

Sample Output

```
Alice
Bob
```