2018中国大学生程序设计竞赛 - 网络选拔赛题面

比赛链接:http://acm.hdu.edu.cn/userloginex.php?cid=812
(http://acm.hdu.edu.cn/userloginex.php?cid=812)

1001 Buy and Resell

Problem

The Power Cube is used as a stash of Exotic Power. There are n cities numbered $1, 2, \ldots, n$ where allowed to trade it. The trading price of the Power Cube in the i -th city is a_i dollars per cube. Noswal is a foxy businessman and wants to quietly make a fortune by buying and reselling Power Cubes. To avoid being discovered by the police, Noswal will go to the i -th city and choose exactly one of the following three options on the i -th day:

1. spend a_i dollars to buy a Power Cube
2. resell a Power Cube and get a_i dollars if he has at least one Power Cube
3. do nothing

Obviously, Noswal can own more than one Power Cubes at the same time. After going to the n cities, he will go back home and stay away from the cops. He wants to know the maximum profit he can earn. In the meanwhile, to lower the risks, he wants to minimize the times of trading (include buy and sell) to get the maximum profit. Noswal is a foxy and successful businessman so you can assume that he has infinity money at the beginning.

Input

There are multiple test cases. The first line of input contains a positive integer T ($T \leq 250$), indicating the number of test cases. For each test case:
The first line has an integer n . ($1 \leq n \leq 10^5$)
The second line has n integers $a_1, a_2, \ldots, a_n$ where a_i means the trading price (buy or sell) of the Power Cube in the i -th city. ($1 \leq a_i \leq 10^9$)
It is guaranteed that the sum of all n is no more than 5×10^5 .

Output

For each case, print one line with two integers —— the maximum profit and the minimum times of trading to get the maximum profit.

Sample Input

3
4
1 2 10 9
5
9 5 9 10 5
2
2 1

Sample Output

16 4
5 2
0 0

Hint

In the first case, he will buy in 1, 2 and resell in 3, 4. profit = - 1 - 2 + 10 + 9 = 16
In the second case, he will buy in 2 and resell in 4. profit = - 5 + 10 = 5
In the third case, he will do nothing and earn nothing. profit = 0

1002 Congruence equation

Problem

There is a sequence A which contains k integers.
Now we define $f\left(m\right)$ is the number of different sequence C that satisfies for i from 1 to k :

1. If $A_i = -1$, C_i can be any integer in the range of $[0, m)$ .Otherwise $C_i \equiv A_i \pmod m$
2. $\sum\limits_{i=1}^{k} C_i x_i \equiv 1 \pmod m$ (x_i are variables) have a solution in the range of integer.

Calculate the answer of $\sum\limits_{m=1}^{n} f(m) \pmod{10^9+7}$.

Input

The first line contains only one integer $T (T \leq 100)$, which indicates the number of test cases.
For each test case, the first line contains two integers k and n .($1 \leq k \leq 50, 1 \leq n \leq 10^9$)
The second line contains k integers: $A_1, A_2 \dots A_k (-1 \leq A_i \leq 10^9)$
There are at most 10 test cases which satisfies $n \geq 10^6$

Output

For each test case, output one line “Case #x: y”, where x is the case number (starting from 1) and y is the answer after mod 1000000007 ($10^9 + 7$).

Sample Input

2
5 10
-1 -1 8 -1 -1
3 20
-1 6 18

Sample Output

Case #1: 24354
Case #2: 140

1003 Dream

Problem

Freshmen frequently make an error in computing the power of a sum of real numbers, which usually origins from an incorrect equation $(m + n)^p = m^p + n^p$, where m, n, p are real numbers. Let’s call it `Beginner's Dream` .

For instance, $(1 + 4)^2 = 5^2 = 25$, but $1^2 + 4^2 = 17 \neq 25$. Moreover, $\sqrt{9 + 16} = \sqrt{25} = 5$, which does not equal $3 + 4 = 7$.

Fortunately, in some cases when p is a prime, the identity

$$(m + n)^p = m^p + n^p$$

holds true for every pair of non-negative integers m, n which are less than p , with appropriate definitions of addition and multiplication.

You are required to redefine the rules of addition and multiplication so as to make the beginner's dream realized.

Specifically, you need to create your custom addition and multiplication, so that when making calculation with your rules the equation $(m+n)^p = m^p + n^p$ is a valid identity for all non-negative integers m, n less than p . Power is defined as

$$a^p = \begin{cases} 1, & p = 0 \\ a^{p-1} \cdot a, & p > 0 \end{cases}$$

Obviously there exists an extremely simple solution that makes all operation just produce zero. So an extra constraint should be satisfied that there exists an integer $q\ (0 < q < p)$ to make the set $\{q^k \mid 0 < k < p, k \in \mathbb{Z}\}$ equal to $\{k \mid 0 < k < p, k \in \mathbb{Z}\}$. What's more, the set of non-negative integers less than p ought to be closed under the operation of your definitions.

Input

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

For every case, there is only one line contains an integer $p\ (p < 2^{10})$, described in the problem description above. p is guranteed to be a prime.

Output

For each test case, you should print $2p$ lines of p integers.

The j -th($1 \le j \le p$) integer of i -th($1 \le i \le p$) line denotes the value of $(i-1) + (j-1)$. The j -th($1 \le j \le p$) integer of $(p+i)$ -th($1 \le i \le p$) line denotes the value of $(i-1) \cdot (j-1)$.

Sample Input

1
2

Sample

0 1
1 0
0 0
0 1

Hint

Hint for sample input and output:
From the table we get $0+1=1$, and thus $(0+1)^2=1^2=1\cdot 1=1$. On the other hand, $0^2=0\cdot 0=0$, $1^2=1\cdot 1=1$, $0^2+1^2=0+1=1$.
They are the same.

1004 Find Integer

Problem

people in USSS love math very much, and there is a famous math problem .

give you two integers n ,a ,you are required to find 2 integers b ,c such that a^n + $b^n=c^n$.

Input

one line contains one integer T ;$(1\le T\le 1000000)$

next T lines contains two integers n ,a ;$(0\le n\le 1000$,000 ,$000, 3\le a\le 40000)$

Output

print two integers b ,c if b ,c exits;$(1\le b, c\le 1000$,000 ,$000)$;

else print two integers -1 -1 instead.

Sample Input

1
2 3

Sample Output

4 5

1005 GuGu Convolution

Problem

As a newbie, XianYu is now learning generating function!
Given a series $\{a\} = (a_0, a_1, a_2, \cdots)$, we can easily define its exponential generating function as $g_{\{a\}}(x) = \sum_{i=0}^{\infty} \frac{a_i}{i!} x^i$.
Now we define a series $\{u_c\} = (c^0, c^1, c^2, \cdots)$ and let e_c represents the u_c with 0 filled in all its even items. Formally, $\{e_c\} = (0, c^1, 0, c^3, 0, c^5, \cdots)$.

'Do you know convolution?'
'GU GU.' GuGu utters.
'Well, let me show you.
Given two generating function $g_{\{a\}}$ and $g_{\{b\}}$, the convolution can be represented as $G(x) = (g_{\{a\}} * g_{\{b\}})(x) = \sum_{n=0}^{\infty} (\sum_{i+j=n} a_i b_j) x^n$.
It is quite easy, right?'
'GU GU.' GuGu utters.
'Ok. Now you have to find the coefficient of x^n of the convolution $G(x) = (g_{\{u_A\}} * g_{\{e_{\sqrt{B}}\}})$, given n , A and B .
Let G_n representes that coefficient, you should tell me $n!G_n$.
You may know the severity of unsolving this problem.'

As GuGu is not that kind of good for it, it turns to you for help.
'GU GU!' GuGu thanks.

Input

There is an integer T in the first line, representing the number of cases.
Then followed T lines, and each line contains four integers A, B, n, p . The meaning of A, B, n is described above, and that of p will be described in Output session.
$1 \le T \le 10^5$
$1 \le A, B \le 10^6$
$1 \le n \le 10^{18}$
$1 \le p \le 10^9$

Output

Let $\sum\limits_{i=1}^{q} a_i\sqrt{b_i}$ represents the answer, with $b_i \neq b_j, \gcd(b_i, b_j) = 1, 1 \leq i < j \leq q$, and none of b_i 's factors is square number.
Print T lines only. Each line comes with a number q and followed q pairs of integers $a_i\ b_i$, with b_i in increasing order. Since a_i may be large, please print $a_i\%p$ instead.
All integers in the same line should be seperated by exactly one space.
You may find that each answer is unique.

Sample Input

3
1 1 1 7
523 12 2 2100
1 1 1000000000000000000 998244353

Sample Output

1 1 1
1 2092 3
1 121099884 1

Hint

First Sample: $1!(\frac{1^0}{0!}\frac{\sqrt{1}^1}{1!}+\frac{1^1}{1!}\frac{0}{0!}) = 1\sqrt{1}$
Second Sample: $2!(\frac{523^0}{0!}\frac{0}{2!}+\frac{523^1}{1!}\frac{\sqrt{12}^1}{1!}+\frac{523^2}{2!}\frac{0}{0!}) = 2092\sqrt{3}$
P.S.: $1046\sqrt{12}$ is equal to the answer. However, 12 has a factor $4 = 2^2$ so it can't be output directly.

1006 Neko and Inu

Problem

Neko and Inu are good friends.
Neko has a box of energy crystals A . Inu has a box of energy crystals B .
Both of A and B have n crystals. Each crystal has a different energy. You can think that energy is a positive integer.
Unfortunately, A and B are mixed together when Neko and Inu are playing games.
Each pair of crystals $u(u \in A)$ and $v(v \in B)$ can produce two new crystals which

energies are $u+v$ and $|u-v|$. The old crystals will disappear in the end.
So there are $2n^2$ crystals finally. Let the new box of energy crystals called C . Neko and Inu are surprised to find each crystal in C is different and their energies are continuous odd number from 1 to $4n^2-1$.
Now, Neko and Inu want to know how many different A and B can be mixed into C .
Calculate the answer after mod 998244353 .

Input

The first line contains only one integer $T(T \leq 50)$, which indicates the number of test cases.
For each test case, the first line contains one integer m ,indicating the number of distinct primes of n .($1 \leq m \leq 10^5$).
The next m line, each line contains two integers p_i, a_i .
Where p_i is a prime.$n = \prod p_i^{a_i}, a_i > 0, \sum a_i \leq 10^5, p_i \leq 10^9+9$.
There are at most 10 test cases which satisfies $\sum a_i \geq 10^3$.

Output

For each test case, output one line “Case #x: y”, where x is the case number (starting from 1) and y is the answer after mod 998244353 .

Sample Input

```
2
1
2 1
2
2 2
5 2
```

Sample Output

```
Case #1: 6
Case #2: 6060
```

Hint

for the first case:
A = {1, 3}, B = {4, 12}
A = {4, 12}, B = {1, 3}
A = {3, 5}, B = {6, 10}

A = {6, 10}, B = {3, 5}
A = {2, 6}, B = {7, 9}
A = {7, 9}, B = {2, 6}

1007 Neko’s loop

Problem

Neko has a loop of size n .
The loop has a happy value a_i on the $i-th(0 \leq i \leq n-1)$ grid.
Neko likes to jump on the loop.She can start at anywhere. If she stands at $i-th$ grid, she will get a_i happy value, and she can spend one unit energy to go to $((i+k) \bmod n)-th$ grid. If she has already visited this grid, she can get happy value again. Neko can choose jump to next grid if she has energy or end at anywhere.
Neko has m unit energies and she wants to achieve at least s happy value.
How much happy value does she need at least before she jumps so that she can get at least s happy value? Please note that the happy value which neko has is a non-negative number initially, but it can become negative number when jumping.

Input

The first line contains only one integer $T(T \leq 50)$, which indicates the number of test cases.
For each test case, the first line contains four integers $n, s, m, k(1 \leq n \leq 10^4, 1 \leq s \leq 10^{18}, 1 \leq m \leq 10^9, 1 \leq k \leq n)$.
The next line contains n integers, the $i-th$ integer is $a_{i-1}(-10^9 \leq a_{i-1} \leq 10^9)$

Output

For each test case, output one line “Case #x: y”, where x is the case number (starting from 1) and y is the answer.

Sample Input

2
3 10 5 2
3 2 1
5 20 6 3
2 3 2 1 5

Sample Output

Case #1: 0
Case #2: 2

1008 Search for Answer

Problem

Given a (https://en.wikipedia.org/wiki/Tournament_(graph_theory) (https://en.wikipedia.org/wiki/Tournament_(graph_theory))), you need to determine the direction of the remaining sides to maximize the answer. The answer is calculated in the following way. The vertices are labeled from 0 to $n-1$, and the matrix s is used to represent the edges.

```
int ans = 0;
for(int a = 0; a < n; ++a){
    for(int b = 0; b < n; ++b){
        if(b == a) continue;
        for(int c = 0; c < n; ++c){
            if(c == a || c == b) continue;
            for(int d = 0; d < n; ++d){
                if(d == a || d == b || d == c) continue;
                if(s[a][b] == s[b][c] && s[b][c] == s[c][d] && s[c][d] == s
                    ans++;
                }
                if(s[a][b] != s[b][c] && s[b][c] != s[c][d] && s[c][d] != s
                    ans--;
                }
            }
        }
    }
}
```

Input

The first line of input is a single line of integer $T(2 \leq T \leq 10)$, the number of test cases. In each test case, there are 1 integers $n(5 \leq n \leq 200)$, denoting the number of vertices. Then in the following n lines, the i -th line has a string of length n . If $s[i][j]=1$, there is an edge from i to j . If $s[i][j]=2$ means you need to determine the direction for that edge. The input is guaranteed to be legal, and the number of $(i, j)(i < j)$ satisfying $s[i][j] = s[j][i] = 2$ is less than 200 . The data is [b]randomly [/b] generated.

Output

For each set of test samples, output one line to represent the maximized answer.

Sample Input

```
2
5
02112
20221
02001
02102
20020
5
01112
00022
01012
02002
22220
```

Sample Output

```
40
24
```

Hint

One solution to the first case is:

```
00110
10001
01001
01100
10010
```

1009 Tree and Permutation

Problem

There are N vertices connected by $N-1$ edges, each edge has its own length.
The set { $1, 2, 3, \ldots, N$ } contains a total of $N!$ unique permutations, let's say the i -th permutation is P_i and $P_{i,j}$ is its j -th number.
For the i -th permutation, it can be a traverse sequence of the tree with N vertices, which means we can go from the $P_{i,1}$ -th vertex to the $P_{i,2}$ -th vertex by the shortest path, then go to the $P_{i,3}$ -th vertex (also by the shortest path) , and so on. Finally we'll reach the $P_{i,N}$ -th vertex, let's define the total distance of this route as $D(P_i)$, so please calculate the sum of $D(P_i)$ for all $N!$ permutations.

Input

There are 10 test cases at most.
The first line of each test case contains one integer N ($1 \leq N \leq 10^5$) .
For the next $N-1$ lines, each line contains three integer X , Y and L , which means there is an edge between X -th vertex and Y -th of length L ($1 \leq X, Y \leq N, 1 \leq L \leq 10^9$) .

Output

For each test case, print the answer module $10^9 + 7$ in one line.

Sample Input

```
3
1 2 1
2 3 1
3
1 2 1
1 3 2
```

Sample Output

```
16
24
```

1010 YJJ’s Salesman

Problem

YJJ is a salesman who has traveled through western country. YJJ is always on journey. Either is he at the destination, or on the way to destination.
One day, he is going to travel from city A to southeastern city B. Let us assume that A is $(0,0)$ on the rectangle map and B $(10^9,10^9)$. YJJ is so busy so he never turn back or go twice the same way, he will only move to east, south or southeast, which means, if YJJ is at (x,y) now $(0 \le x \le 10^9, 0 \le y \le 10^9)$, he will only forward to $(x+1,y)$, $(x,y+1)$ or $(x+1,y+1)$.
On the rectangle map from $(0,0)$ to $(10^9,10^9)$, there are several villages scattering on the map. Villagers will do business deals with salesmen from northwestern, but not northern or western. In mathematical language, this means when there is a village k on (x_k,y_k) $(1 \le x_k \le 10^9, 1 \le y_k \le 10^9)$, only the one who was from (x_k-1,y_k-1) to (x_k,y_k) will be able to earn v_k dollars.(YJJ may get different number of dollars from different village.)
YJJ has no time to plan the path, can you help him to find maximum of dollars YJJ can get.

Input

The first line of the input contains an integer T $(1 \le T \le 10)$,which is the number of test cases.

In each case, the first line of the input contains an integer N $(1 \le N \le 10^5)$ .The following N lines, the k -th line contains 3 integers, x_k, y_k, v_k $(0 \le v_k \le 10^3)$, which indicate that there is a village on (x_k,y_k) and he can get v_k dollars in that village.
The positions of each village is distinct.

Output

The maximum of dollars YJJ can get.

Sample Input

1
3
1 1 1
1 2 2
3 3 1

Sample Output

3