Problem A. Problem A

时间限制: 2 s

空间限制: 32 megabytes

Description

Given an integer n, Chiaki would like to find three positive integers x, y and z such that:$n = x+y+z$, $x|n$,$y|n$, $z|n$ and xyz is maximum.

Input

There are multiple test cases. The first line of input contains an integer$T(1 \leq T \leq 10^6)$, indicating the number of test cases. For each test case: The first line contains an integer $n(1 \leq n \leq 10^6)$.

Output

For each test case, output an integer denoting the maximum xyz. If there no such integers, output -1 instead.

Example

Input	Output
3 1 2 3	-1 -1 1

Problem B. Problem B

时间限制: 1 s
空间限制: 256 megabytes

Description

m students, including Kazari, will take an exam tomorrow. The paper consists of exactly n problems, the i_{th} problem contains ai correct answers and bi incorrect answers, i.e. the i_{th} problem contains $ai + bi$ candidates in total. Each student should choose exactly one candidate as answer for each problem. If the answer to a certain problem is correct, then the student will get one point. The student who gets the most points wins. Students only know the structure of the paper, but they are able to talk with each other during the exam. They decide to choose a subset S of all n problems, and they will only be able to submit answers on these problems. They want to know the maximum size of S that the winner among them will solve all the problems in S if they take the optimal strategy.

For sample 1, students can choose S=$\{1\}$, and we need at least 4 students to guarantee the winner solve the only problem.

For sample 2, students can choose $S = \{1, 2, 3\}$, and we need at least 24 students to guarantee the winner solve these three problems, but if $|S| = 4$, we need at least 96 students, which is more than 50.

Input

The first line of the input contains an integer $T(1 \le T \le 100)$ denoting the number of test cases. Each test case starts with two integers $n, m(1 \le n \le 100, 1 \le m \le 10^9)$, denoting the number of problems and the number of students. Each of next n lines contains two integers ai, bi $(1 \le bi \le 100, ai = 1)$, indicating the number of correct answers and the number of incorrect answers of the i-th problem.

Output

For each test case, print an integer denoting the maximum size of S.

Example

Input	Output
2 3 5 1 3 1 3 1 3 5 50 1 1 1 3 1 2 1 3 1 5	1 3

Problem C. Problem C

时间限制: 2 s

空间限制: 256 megabytes

Description

Let us define a sequence as below

$F_1 = A$

$F_2 = B$

$F_n = C \times F_{n-2} + D \times F_{n-1} + \lfloor \frac{P}{n} \rfloor$

Your job is simple, for each task, you should output Fn module $10^9 + 7$.

Input

The first line has only one integer T, indicates the number of tasks.

Then, for the next T lines, each line consists of 6 integers, A, B, C, D, P, n.

$1 \leq T \leq 20, 0 \leq A, B, C, D \leq 10^9, 1 \leq P, n \leq 10^9$。

Example

Input	Output
2 3 3 2 1 3 5 3 2 2 2 1 4	36 24

Problem D. Problem D

时间限制: 2 s
空间限制: 256 megabytes

Description

Chika is elected mayor of Numazu. She needs to manage the traffic in this city. To manage the traffic is too hard for her. So she needs your help. You are given the map of the city ——an undirected connected weighted graph with N nodes and N edges, and you have to finish Q missions. Each mission consists of 3 integers OP, X and Y. When OP=0, you need to modify the weight of the Xth edge to Y. When OP=1, you need to calculate the length of the shortest path from node X to node Y.

Input

The first line contains a single integer T, the number of test cases. Each test case starts with a line containing two integers N and Q, the number of nodes (and edges) and the number of queries. $(3 \leq N \leq 10^5)(1 \leq Q \leq 10^5)$ Each of the following N lines contain the description of the edges. The ith line represents the ith edge, which contains 3 space-separated integers ui, vi, and wi. This means that there is an undirected edge between nodes ui and vi, with a weight of wi. $(1 \leq ui, vi \leq N)(1 \leq wi \leq 10^5)$ Then Q lines follow, the ith line contains 3 integers OP, X and Y. The meaning has been described above.$(0 \leq OP \leq 1)(1 \leq X \leq 10^5)(1 \leq Y \leq 10^5)$ It is guaranteed that the graph contains no self loops or multiple edges.

Output

For each test case, and for each mission whose OP=1, print one line containing one integer, the length of the shortest path between X and Y.

Example

Input	Output
2 5 5 1 2 3 2 3 5 2 4 5 2 5 1 4 3 3 0 1 5 1 3 2 1 5 4 0 5 4 1 5 1 5 3 1 2 3 1 3 2 3 4 4 4 5 5 2 5 5 0 1 3 0 4 1 1 1 4	5 6 6 6

Problem E. Problem E

时间限制: 2.5 s
空间限制: 256 megabytes

Description

Mr.Quin love fishes so much and Mr.Quin' s city has a nautical system,consisiting of N ports and M shipping lines. The ports are numbered 1 to N. Each line is occupied by a Weitian. Each Weitian has an identification number.

The i-th ($1 \leq i \leq M$) line connects port Ai and Bi ($Ai \neq Bi$) bidirectionally, and occupied by Ci Weitian (At most one line between two ports).

When Mr.Quin only uses lines that are occupied by the same Weitian, the cost is 1 XiangXiangJi. Whenever Mr.Quin changes to a line that is occupied by a different Weitian from the current line, Mr.Quin is charged an additional cost of 1 XiangXiangJi. In a case where Mr.Quin changed from some Weitian A's line to another Weitian's line changes to Weitian A's line again, the additional cost is incurred again.

Mr.Quin is now at port 1 and wants to travel to port N where live many fishes. Find the minimum required XiangXiangJi (If Mr.Quin can' t travel to port N, print -1 instead)

Input

There might be multiple test cases, no more than 20. You need to read till the end of input.

For each test case,In the first line, two integers N ($2 \leq N \leq 100000$) and M ($0 \leq M \leq 200000$), representing the number of ports and shipping lines in the city.

In the following m lines, each contain three integers, the first and second representing two ends Ai and Bi of a shipping line ($1 \leq Ai, Bi \leq N$) and the third representing the identification number Ci ($1 \leq Ci \leq 1000000$) of Weitian who occupies this shipping line.

Output

For each test case output the minimum required cost. If Mr.Quin can' t travel to port N, output -1 instead.

Example

Input	Output
3 3 1 2 1 1 3 2 2 3 1 2 0 3 2 1 2 1 2 3 2	1 -1 2

Problem F. Problem F

时间限制: 1 s
空间限制: 128 megabytes

Description

Lawson is a magic swordsman with k kinds of magic attributes v1,v2,v3,⋯,vk. Now Lawson is faced with n monsters and the i-th monster also has k kinds of defensive attributes ai,1,ai,2,ai,3,⋯,ai,k. If $v1 \geq ai$,1 and $v2 \geq ai$,2 and $v3 \geq ai$,3 and ⋯and $vk \geq ai$,k, Lawson can kill the i-th monster (each monster can be killed for at most one time) and get EXP from the battle, which means vj will increase bi,j for j=1,2,3,⋯,k. Now we want to know how many monsters Lawson can kill at most and how much Lawson's magic attributes can be maximized.

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case: The first line has two integers n and k ($1 \leq n \leq 10^5, 1 \leq k \leq 5$). The second line has k non-negative integers (initial magic attributes) v1,v2,v3,⋯,vk. For the next n lines, the i-th line contains 2k non-negative integers ai,1,ai,2,ai,3,⋯,ai,k,bi,1,bi,2,bi,3,⋯,bi,k. It's guaranteed that all input integers are no more than 10^9 and $vj + \sum_{i=1}^{n} b_{i,j} \leq 10^9$ for j=1,2,3,⋯,k.

It is guaranteed that the sum of all $n \leq 5 \times 10^5$. The input data is very large so fast IO is recommended.

Output

For each test case: The first line has one integer which means the maximum number of monsters that can be killed by Lawson. The second line has k integers v 1,v 2,v 3,⋯,v k and the i-th integer means maximum of the i-th magic attibute.

Example

Input	Output
1 4 3 7 1 1 5 5 2 6 3 1 24 1 1 1 2 1 0 4 1 5 1 1 6 0 1 5 3 1	3 23 8 4

Problem G. Problem G

时间限制: 1.5 s
空间限制: 64 megabytes

Description

Today XianYu is too busy with his homework, but the boring GuGu is still disturbing him!!!!!!

At the break time, an evil idea arises in XianYu's mind. 'Come on, you xxxxxxx little guy.'

'I will give you a function $\phi(x)$ which counts the positive integers up to x that are relatively prime to x.'

'And now I give you a fishtion, which named GuGu Fishtion, in memory of a great guy named XianYu and a disturbing and pitiful guy GuGu who will be cooked without solving my problem in 5 hours.' 'The given fishtion is defined as follow:

$Gu(a,b) = \frac{\phi(ab)}{\phi(a)\phi(b)}$

And now you, the xxxxxxx little guy, have to solve the problem below given m,n,p.' $(\sum_{a=1}^{m}\sum_{b=1}^{n} Gu(a,b)) \pmod p$

So SMART and KINDHEARTED you are, so could you please help GuGu to solve this problem? 'GU GU!' GuGu thanks.

Input

Input contains an integer T indicating the number of cases, followed by T lines. Each line contains three integers m,n,p as described above. $1 \le T \le 3$

$1 \le m, n \le 1,000,000$

$max(m,n) < p \le 1,000,000,007$

And given p is a prime.

Output

Please output exactly T lines and each line contains only one integer representing the answer.

Example

Input	Output
1 5 7 23	2

Problem H. Problem H

时间限制: 1 s
空间限制: 32 megabytes

Description

Alice and Bob are playing a game. The game is played on a set of positive integers from 1 to n. In one step, the player can choose a positive integer from the set, and erase all of its divisors from the set. If a divisor doesn't exist it will be ignored. Alice and Bob choose in turn, the one who cannot choose (current set is empty) loses. Alice goes first, she wanna know whether she can win. Please judge by outputing Yes or No.

Input

There might be multiple test cases, no more than 10. You need to read till the end of input. For each test case, a line containing an integer n. ($1 \leq n \leq 500$)

Output

A line for each test case, Yes or No.

Example

Input	Output
1	Yes

Problem I. Problem I

时间限制: 1 s
空间限制: 32 megabytes

Description

Long long ago, there was an integer sequence a. Tonyfang think this sequence is messy, so he will count the number of inversions in this sequence. Because he is angry, you will have to pay x yuan for every inversion in the sequence. You don't want to pay too much, so you can try to play some tricks before he sees this sequence. You can pay y yuan to swap any two adjacent elements. What is the minimum amount of money you need to spend? The definition of inversion in this problem is pair (i,j) which $1 \leq i < j \leq n$ and $ai > aj$.

Input

There are multiple test cases, please read till the end of input file. For each test, in the first line, three integers, n,x,y, n represents the length of the sequence. In the second line, n integers separated by spaces, representing the orginal sequence a. $1 \leq n, x, y \leq 100000$, numbers in the sequence are in $[-10^9, 10^9]$.

There're 10 test cases.

Output

For every test case, a single integer representing minimum money to pay.

Example

Input	Output
3 233 666 1 2 3 3 1 666 3 2 1	0 3

Problem J. Problem J

时间限制: 1 s

空间限制: 32 megabytes

Description

Chiaki often participates in international competitive programming contests. The time zone becomes a big problem. Given a time in Beijing time (UTC +8), Chiaki would like to know the time in another time zone s.

Input

There are multiple test cases. The first line of input contains an integer $T(1 \leq T \leq 10^6)$, indicating the number of test cases. For each test case: The first line contains two integers a, b $(0 \leq a \leq 23, 0 \leq b \leq 59)$ and a string s in the format of "UTC+X", "UTC-X", "UTC+X.Y", or "UTC-X.Y" $(0 \leq X, X.Y \leq 14, 0 \leq Y \leq 9)$.

Output

For each test, output the time in the format of `hh:mm` (24-hour clock).

Example

Input	Output
3 11 11 UTC+8 11 12 UTC+9 11 23 UTC+0	11:11 12:12 03:23

Problem K. Problem K

时间限制: 4 s
空间限制: 256 megabytes

Description

Wayne is an administrator of some metropolitan area network. The network he managed can be formed into a simple connected graph with n vertices and m edges, which means the graph does not contain any self-loop and there is at most one edge and at least one path between every two vertices. Furthermore, the network also meets the condition there are at most two non-intersect paths, which share no common edges, between every two vertices.

Wayne knows the bandwidth of each edge in that network but it is not enough for him. He needs plenty of statistic data to display, for example, he wants to know what the maximum data rate between every two vertices is. For the sake of clarity, vertices in that are numbered from 1 to n and the maximum bits each edge could transmit per second will be given. Your task is assisting him to calculate the value of the following formula:

$\sum_{1\leq s<t\leq n}(s \oplus t \oplus flow(s,t))$,

where $\oplus$ means the bitwise exclusive-OR operator and flow(s,t) means the maximum bits that could be transmitted per second between vertex s and vertex t.

Input

The first line contains one integer T, indicating the number of test cases. The following lines describe all the test cases. For each test case: The first line contains two integers n and m. Each of the following m lines contains three integers u,v and w, indicating a bidirectional edge between vertex u and vertex v that can transmit at most w bits per second in each direction. $1 \leq T \leq 100, 1 \leq n \leq 10^5, n-1 \leq m \leq 32(n-1), 1 \leq u, v \leq n, u \neq v, 0 \leq w < 10^9$. It is guaranteed that the sum of n in all test cases does not exceed 10^6 and the size of the standard input file does not exceed 26 MiB.

Output

For each test case, print the answer in one line.

Example

Input	Output
2 3 3 1 2 5 2 3 6 3 1 5 5 6 1 2 5 2 3 6 3 1 5 3 4 6 4 5 5 5 3 6	27 116

Problem L. Problem L

时间限制: 1 s

空间限制: 512 megabytes

Description

There is a positive integer sequence a1,a2,...,an with some unknown positions, denoted by 0. Little Q will replace each 0 by a random integer within the range [1,m] equiprobably. After that, he will calculate the value of this sequence using the following formula : $\Pi_{i=1}^{n-3} v[gcd(ai, ai+1, ai+2, ai+3)]$

Little Q is wondering what is the expected value of this sequence. Please write a program to calculate the expected value.

Input

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

In each test case, there are 2 integers $n, m(4 \leq n \leq 100, 1 \leq m \leq 100)$in the first line, denoting the length of the sequence and the bound of each number. In the second line, there are n integers a1,a2,...,an$(0 \leq ai \leq m)$, denoting the sequence. In the third line, there are m integers v1,v2,...vm$(1 \leq vi \leq 10^9)$, denoting the array v.

Output

For each test case, print a single line containing an integer, denoting the expected value. If the answer is $\frac{A}{B}$, please print $C(0 \leq C < 10^9 + 7)$ where $A\ C \times B(mod 10^9 + 7)$.

Example

Input	Output
2 6 8 4 8 8 4 6 5 10 20 30 40 50 60 70 80 4 3 0 0 0 0 3 2 4	8000 3