Problem A. Hanki Panki

Time Limit 1000 ms
Mem Limit 262144 kB

You are given three digits a, b, c. Two of them are equal, but the third one is different from the other two.

Find the value that occurs exactly once.

Input

The first line contains a single integer t ($1 \leq t \leq 270$) — the number of test cases.

The only line of each test case contains three digits a, b, c ($0 \leq a, b, c \leq 9$). Two of the digits are equal, but the third one is different from the other two.

Output

For each test case, output the value that occurs exactly once.

Examples

<table>
<tr><th>Input</th><th>Output</th></tr>
<tr><td><pre>10
1 2 2
4 3 4
5 5 6
7 8 8
9 0 9
3 6 3
2 8 2
5 7 7
7 7 5
5 7 5</pre></td><td><pre>1
3
6
7
0
6
8
5
5
7</pre></td></tr>
</table>

Problem B. Matai Nosto

Time Limit 1000 ms

Mem Limit 262144 kB

Anna and Katie ended up in a secret laboratory.

There are $a + b + c$ buttons in the laboratory. It turned out that a buttons can only be pressed by Anna, b buttons can only be pressed by Katie, and c buttons can be pressed by either of them. Anna and Katie decided to play a game, taking turns pressing these buttons. Anna makes the first turn. Each button can be pressed at most once, so at some point, one of the girls will not be able to make her turn.

The girl who cannot press a button loses. Determine who will win if both girls play optimally.

Input

The first line contains a single integer t ($1 \leq t \leq 10^4$) — the number of test cases.

Each test case consists of three integers a, b, and c ($1 \leq a, b, c \leq 10^9$) — the number of buttons that can only be pressed by Anna, the number of buttons that can only be pressed by Katie, and the number of buttons that can be pressed by either of them, respectively.

Output

For each test case, output `First` if Anna wins, or `Second` if Katie wins.

Examples

Input	Output
5 1 1 1 9 3 3 1 2 3 6 6 9 2 2 8	First First Second First Second

Note

For the simplicity of the explanation, we will numerate the buttons by the numbers from 1 to $a + b + c$: the first a buttons can only be pressed by Anna, the next b buttons can only be pressed by Katie, and the last c buttons can be pressed by either of them.

In the first test case, Anna can press the 3-rd button on the first turn. Then Katie will press the 2-nd button (since it is the only possible turn for her). Then Anna will press the 1-st button. Katie won't have a button to press, so Anna will win.

In the second test case, Anna can press the first nine buttons in some order on her turns. No matter what buttons Katie will press, all the buttons from the 10-th to the 15-th will be pressed after 12 turns. On the 13-th turn, Anna will press one of the first nine buttons and Katie will not have a button to press on her turn. Thus, Anna will win.

In the third test case, the game can proceed as follows:

- On the 1-st turn Anna presses the 5-th button.
- On the 2-st turn Katie presses the 4-th button.
- On the 3-st turn Anna presses the 6-th button.
- On the 4-st turn Katie presses the 3-th button.
- On the 5-st turn Anna presses the 1-th button.
- On the 6-st turn Katie presses the 2-th button.
- Anna cannot make the turn, so Katie wins.

It can be shown that Katie can win no matter what moves Anna takes.

Problem C. Kemon Acho Baby

Time Limit 1000 ms
Mem Limit 262144 kB

Vanya and Vova are playing a game. Players are given an integer n. On their turn, the player can add 1 to the current integer or subtract 1. The players take turns; Vanya starts. If **after** Vanya's move the integer is divisible by 3, then he wins. If 10 moves have passed and Vanya has not won, then Vova wins.

Write a program that, based on the integer n, determines who will win if both players play optimally.

Input

The first line contains the integer t ($1 \leq t \leq 100$) — the number of test cases.

The single line of each test case contains the integer n ($1 \leq n \leq 1000$).

Output

For each test case, print "`First`" without quotes if Vanya wins, and "`Second`" without quotes if Vova wins.

Examples

Input	Output
6 1 3 5 100 999 1000	First Second First First Second First

Problem D. Tumi Ke?

Time Limit 1000 ms
Mem Limit 524288 kB

Winnie-the-Pooh likes honey very much! That is why he decided to visit his friends. Winnie has got three best friends: Rabbit, Owl and Eeyore, each of them lives in his own house. There are winding paths between each pair of houses. The length of a path between Rabbit's and Owl's houses is a meters, between Rabbit's and Eeyore's house is b meters, between Owl's and Eeyore's house is c meters.

For enjoying his life and singing merry songs Winnie-the-Pooh should have a meal n times a day. Now he is in the Rabbit's house and has a meal for the first time. Each time when in the friend's house where Winnie is now the supply of honey is about to end, Winnie leaves that house. If Winnie has not had a meal the required amount of times, he comes out from the house and goes to someone else of his two friends. For this he chooses one of two adjacent paths, arrives to the house on the other end and visits his friend. You may assume that when Winnie is eating in one of his friend's house, the supply of honey in other friend's houses recover (most probably, they go to the supply store).

Winnie-the-Pooh does not like physical activity. He wants to have a meal n times, traveling minimum possible distance. Help him to find this distance.

Input

First line contains an integer n ($1 \le n \le 100$) — number of visits.

Second line contains an integer a ($1 \le a \le 100$) — distance between Rabbit's and Owl's houses.

Third line contains an integer b ($1 \le b \le 100$) — distance between Rabbit's and Eeyore's houses.

Fourth line contains an integer c ($1 \le c \le 100$) — distance between Owl's and Eeyore's houses.

Output

Output one number — minimum distance in meters Winnie must go through to have a meal n times.

Examples

Input	Output
3 2 3 1	3

Input	Output
1 2 3 5	0

Note

In the first test case the optimal path for Winnie is the following: first have a meal in Rabbit's house, then in Owl's house, then in Eeyore's house. Thus he will pass the distance $2 + 1 = 3$.

In the second test case Winnie has a meal in Rabbit's house and that is for him. So he doesn't have to walk anywhere at all.

Problem E. Neshar Bojha

Time Limit 2000 ms
Mem Limit 262144 kB

Given a permutation* p of length n that contains every integer from 0 to $n-1$ and a strip of n cells, St. Chroma will paint the i-th cell of the strip in the color $\operatorname{MEX}(p_1, p_2, \ldots, p_i)^\dagger$.

For example, suppose $p = [1, 0, 3, 2]$. Then, St. Chroma will paint the cells of the strip in the following way: $[0, 2, 2, 4]$.

You have been given two integers n and x. Because St. Chroma loves color x, construct a permutation p such that the number of cells in the strip that are painted color x is **maximized**.

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*A permutation of length n is a sequence of n elements that contains every integer from 0 to $n-1$ exactly once. For example, $[0, 3, 1, 2]$ is a permutation, but $[1, 2, 0, 1]$ isn't since 1 appears twice, and $[1, 3, 2]$ isn't since 0 does not appear at all.

†The MEX of a sequence is defined as the first non-negative integer that does not appear in it. For example, $\operatorname{MEX}(1, 3, 0, 2) = 4$, and $\operatorname{MEX}(3, 1, 2) = 0$.

Input

The first line of the input contains a single integer t ($1 \le t \le 4000$) — the number of test cases.

The only line of each test case contains two integers n and x ($1 \le n \le 2 \cdot 10^5$, $0 \le x \le n$) — the number of cells and the color you want to maximize.

It is guaranteed that the sum of n over all test cases does not exceed $2 \cdot 10^5$.

Output

Output a permutation p of length n such that the number of cells in the strip that are painted color x is **maximized**. If there exist multiple such permutations, output any of them.

Examples

Input	Output
7 4 2 4 0 5 0 1 1 3 3 1 0 4 3	1 0 3 2 2 3 1 0 3 2 4 1 0 0 0 2 1 0 1 2 0 3

Note

The first example is explained in the statement. It can be shown that 2 is the maximum amount of cells that can be painted in color 2. Note that another correct answer would be the permutation $[0, 1, 3, 2]$.

In the second example, the permutation gives the coloring $[0, 0, 0, 4]$, so 3 cells are painted in color 0, which can be shown to be maximum.

Problem F. Ki Koro?

Time Limit 1000 ms
Mem Limit 262144 kB

Alice got a permutation $a_1, a_2, \ldots, a_n$ of $[1, 2, \ldots, n]$, and Bob got another permutation $b_1, b_2, \ldots, b_n$ of $[1, 2, \ldots, n]$. They are going to play a game with these arrays.

In each turn, the following events happen in order:

- Alice chooses either the first or the last element of her array and removes it from the array;
- Bob chooses either the first or the last element of his array and removes it from the array.

The game continues for $n - 1$ turns, after which both arrays will have exactly one remaining element: x in the array a and y in the array b.

If $x = y$, Bob wins; otherwise, Alice wins. Find which player will win if both players play optimally.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \le t \le 10^4$). The description of the test cases follows.

The first line of each test case contains a single integer n ($1 \le n \le 3 \cdot 10^5$).

The next line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le n$, all a_i are distinct) — the permutation of Alice.

The next line contains n integers $b_1, b_2, \ldots, b_n$ ($1 \le b_i \le n$, all b_i are distinct) — the permutation of Bob.

It is guaranteed that the sum of all n does not exceed $3 \cdot 10^5$.

Output

For each test case, print a single line with the name of the winner, assuming both players play optimally. If Alice wins, print `Alice`; otherwise, print `Bob`.

Examples

Input	Output
2 2 1 2 1 2 3 1 2 3 2 3 1	Bob Alice

Note

In the first test case, Bob can win the game by deleting the same element as Alice did.

In the second test case, Alice can delete 3 in the first turn, and then in the second turn, delete the element that is different from the one Bob deleted in the first turn to win the game.

Problem G. Daile Lobon Deso?

Time Limit 2000 ms
Mem Limit 262144 kB

Trulicina gives you integers n, m, and k. It is guaranteed that $k \geq 2$ and $n \cdot m \equiv 0 \pmod{k}$.

Output a n by m grid of integers such that each of the following criteria hold:

- Each integer in the grid is between 1 and k, inclusive.
- Each integer from 1 to k appears an equal number of times.
- No two cells that share an edge have the same integer.

It can be shown that such a grid always exists. If there are multiple solutions, output any.

Input

The first line contains an integer t ($1 \leq t \leq 10^4$) — the number of test cases.

The first line of each test case contains three integers n, m, and k ($2 \leq n \cdot m \leq 2 \cdot 10^5, 2 \leq k \leq n \cdot m, n \cdot m \equiv 0 \pmod{k}$).

It is guaranteed that the sum of $n \cdot m$ over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output n lines, each containing m integers that satisfy the criteria. If there are multiple solutions, output any.

Examples

Input	Output
3 2 2 2 3 4 6 5 5 25	1 2 2 1 1 6 1 6 2 5 2 5 3 4 3 4 17 2 12 25 14 3 1 6 19 11 8 20 23 24 4 9 10 5 13 21 22 7 15 18 16

Problem H. Cholo ghurte jai

Time Limit 1000 ms
Mem Limit 262144 kB

Ntarsis has a box B with side lengths x, y, and z. It lies in the 3D coordinate plane, extending from $(0, 0, 0)$ to (x, y, z).

Ntarsis has a secret box S. He wants to choose its dimensions such that all side lengths are positive integers, and the volume of S is k. He can place S somewhere within B such that:

- S is parallel to all axes.
- every corner of S lies on an integer coordinate.

S is magical, so when placed at an integer location inside B, it will not fall to the ground.

Among all possible ways to choose the dimensions of S, determine the **maximum** number of distinct locations he can choose to place his secret box S inside B. Ntarsis does not rotate S once its side lengths are selected.

Input

The first line consists of an integer t, the number of test cases ($1 \leq t \leq 2000$). The description of the test cases follows.

The first and only line of each test case contains four integers x, y, z and k ($1 \leq x, y, z \leq 2000$, $1 \leq k \leq x \cdot y \cdot z$).

It is guaranteed the sum of all x, sum of all y, and sum of all z do not exceed 2000 over all test cases.

Note that k may not fit in a standard 32-bit integer data type.

Output

For each test case, output the answer as an integer on a new line. If there is no way to select the dimensions of S so it fits in B, output 0.

Examples

Input	Output
7 3 3 3 8 3 3 3 18 5 1 1 1 2 2 2 7 3 4 2 12 4 3 1 6 1800 1800 1800 4913000000	8 2 5 0 4 4 1030301

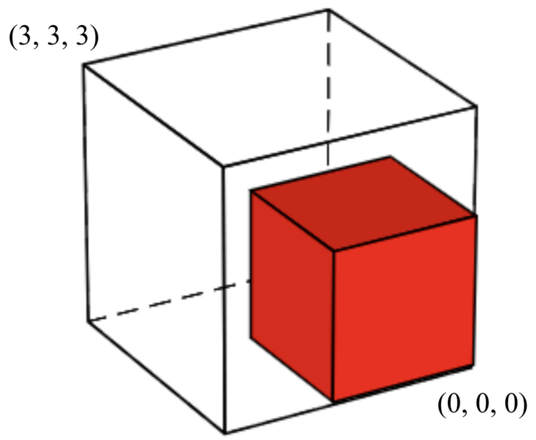
Note

For the first test case, it is optimal to choose S with side lengths 2, 2, and 2, which has a volume of $2 \cdot 2 \cdot 2 = 8$. It can be shown there are 8 ways to put S inside B.

The coordinate with the least x, y, and z values for each possible arrangement of S are:

1. $(0, 0, 0)$
2. $(1, 0, 0)$
3. $(0, 1, 0)$
4. $(0, 0, 1)$
5. $(1, 0, 1)$
6. $(1, 1, 0)$
7. $(0, 1, 1)$
8. $(1, 1, 1)$

The arrangement of S with a coordinate of $(0, 0, 0)$ is depicted below:



For the second test case, S with side lengths 2, 3, and 3 are optimal.