Codeforces Round #432 (Div. 2, based on IndiaHacks Final Round 2017)

A. Arpa and a research in Mexican wave

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Arpa is researching the Mexican wave.

There are n spectators in the stadium, labeled from 1 to n. They start the Mexican wave at time 0.

- At time 1, the first spectator stands.
- At time 2, the second spectator stands.
- ...
- At time k, the k-th spectator stands.
- At time $k + 1$, the $(k + 1)$-th spectator stands and the first spectator sits.
- At time $k + 2$, the $(k + 2)$-th spectator stands and the second spectator sits.
- ...
- At time n, the n-th spectator stands and the $(n - k)$-th spectator sits.
- At time $n + 1$, the $(n + 1 - k)$-th spectator sits.
- ...
- At time $n + k$, the n-th spectator sits.

Arpa wants to know how many spectators are standing at time t.

Input

The first line contains three integers n, k, t ($1 \le n \le 10^9$, $1 \le k \le n$, $1 \le t < n + k$).

Output

Print single integer: how many spectators are standing at time t.

Examples

input
10 5 3
output
3

input
10 5 7
output
5

input
10 5 12
output
3

Note

In the following a sitting spectator is represented as -, a standing spectator is represented as ^.

- At $t = 0$ ---------- $\Rightarrow$ number of standing spectators = 0.
- At $t = 1$ ^--------- $\Rightarrow$ number of standing spectators = 1.
- At $t = 2$ ^^-------- $\Rightarrow$ number of standing spectators = 2.
- At $t = 3$ ^^^------- $\Rightarrow$ number of standing spectators = 3.
- At $t = 4$ ^^^^------ $\Rightarrow$ number of standing spectators = 4.
- At $t = 5$ ^^^^^----- $\Rightarrow$ number of standing spectators = 5.
- At $t = 6$ -^^^^^---- $\Rightarrow$ number of standing spectators = 5.
- At $t = 7$ --^^^^^--- $\Rightarrow$ number of standing spectators = 5.
- At $t = 8$ ---^^^^^-- $\Rightarrow$ number of standing spectators = 5.
- At $t = 9$ ----^^^^^- $\Rightarrow$ number of standing spectators = 5.

- At $t = 10$ `-----^^^^^` $\Rightarrow$ number of standing spectators = 5.
- At $t = 11$ `------^^^^` $\Rightarrow$ number of standing spectators = 4.
- At $t = 12$ `-------^^^` $\Rightarrow$ number of standing spectators = 3.
- At $t = 13$ `--------^^` $\Rightarrow$ number of standing spectators = 2.
- At $t = 14$ `---------^` $\Rightarrow$ number of standing spectators = 1.
- At $t = 15$ `----------` $\Rightarrow$ number of standing spectators = 0.

B. Arpa and an exam about geometry

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Arpa is taking a geometry exam. Here is the last problem of the exam.

You are given three points a, b, c.

Find a point and an angle such that if we rotate the page around the point by the angle, the new position of a is the same as the old position of b, and the new position of b is the same as the old position of c.

Arpa is doubting if the problem has a solution or not (i.e. if there exists a point and an angle satisfying the condition). Help Arpa determine if the question has a solution or not.

Input

The only line contains six integers a_x, a_y, b_x, b_y, c_x, c_y ($|a_x|$, $|a_y|$, $|b_x|$, $|b_y|$, $|c_x|$, $|c_y| \leq 10^9$). It's guaranteed that the points are distinct.

Output

Print "Yes" if the problem has a solution, "No" otherwise.

You can print each letter in any case (upper or lower).

Examples

input
0 1 1 1 1 0
output
Yes

input
1 1 0 0 1000 1000
output
No

Note

In the first sample test, rotate the page around $(0.5, 0.5)$ by 90°.

In the second sample test, you can't find any solution.

C. Five Dimensional Points

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given set of n points in 5-dimensional space. The points are labeled from 1 to n. No two points coincide.

We will call point a *bad* if there are different points b and c, not equal to a, from the given set such that angle between vectors $\vec{ab}$ and $\vec{ac}$ is acute (i.e. strictly less than 90°). Otherwise, the point is called *good*.

The angle between vectors $\vec{x}$ and $\vec{y}$ in 5-dimensional space is defined as $\arccos(\frac{\vec{x} \cdot \vec{y}}{|\vec{x}||\vec{y}|})$, where $\vec{x} \cdot \vec{y} = x_1y_1 + x_2y_2 + x_3y_3 + x_4y_4 + x_5y_5$ is the scalar product and $|\vec{x}| = \sqrt{\vec{x} \cdot \vec{x}}$ is length of $\vec{x}$.

Given the list of points, print the indices of the good points in ascending order.

Input

The first line of input contains a single integer n ($1 \le n \le 10^3$) — the number of points.

The next n lines of input contain five integers a_i, b_i, c_i, d_i, e_i ($|a_i|$, $|b_i|$, $|c_i|$, $|d_i|$, $|e_i| \le 10^3$) — the coordinates of the i-th point. All points are distinct.

Output

First, print a single integer k — the number of good points.

Then, print k integers, each on their own line — the indices of the good points in ascending order.

Examples

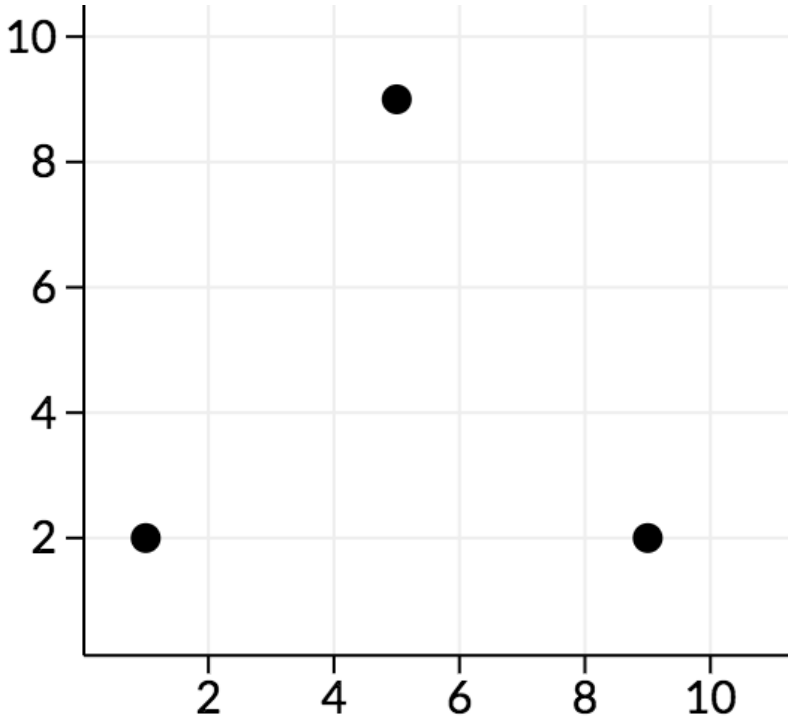
input
6 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1
output
1 1

input
3 0 0 1 2 0 0 0 9 2 0 0 0 5 9 0
output
0

Note

In the first sample, the first point forms exactly a 90° angle with all other pairs of points, so it is good.

In the second sample, along the cd plane, we can see the points look as follows:



We can see that all angles here are acute, so no points are good.

D. Arpa and a list of numbers

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Arpa has found a list containing n numbers. He calls a list bad if and only if it is not empty and gcd (see notes section for more information) of numbers in the list is 1.

Arpa can perform two types of operations:

- Choose a number and delete it with cost x.
- Choose a number and increase it by 1 with cost y.

Arpa can apply these operations to as many numbers as he wishes, and he is allowed to apply the second operation arbitrarily many times on the same number.

Help Arpa to find the minimum possible cost to make the list good.

Input

First line contains three integers n, x and y ($1 \le n \le 5 \cdot 10^5$, $1 \le x, y \le 10^9$) — the number of elements in the list and the integers x and y.

Second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^6$) — the elements of the list.

Output

Print a single integer: the minimum possible cost to make the list good.

Examples

input
4 23 17 1 17 17 16
output
40

input
10 6 2 100 49 71 73 66 96 8 60 41 63
output
10

Note

In example, number 1 must be deleted (with cost 23) and number 16 must increased by 1 (with cost 17).

A gcd (greatest common divisor) of a set of numbers is the maximum integer that divides all integers in the set. Read more about gcd here.

E. Arpa and a game with Mojtaba

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Mojtaba and Arpa are playing a game. They have a list of n numbers in the game.

In a player's turn, he chooses a number p^k (where p is a prime number and k is a positive integer) such that p^k divides at least one number in the list. For each number in the list divisible by p^k, call it x, the player will delete x and add $\frac{x}{p^k}$ to the list. The player who can not make a valid choice of p and k loses.

Mojtaba starts the game and the players alternatively make moves. Determine which one of players will be the winner if both players play optimally.

Input

The first line contains a single integer n ($1 \le n \le 100$) — the number of elements in the list.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^9$) — the elements of the list.

Output

If Mojtaba wins, print "`Mojtaba`", otherwise print "`Arpa`" (without quotes).

You can print each letter in any case (upper or lower).

Examples

input
4 1 1 1 1
output
Arpa

input
4 1 1 17 17
output
Mojtaba

input
4 1 1 17 289
output
Arpa

input
5 1 2 3 4 5
output
Arpa

Note

In the first sample test, Mojtaba can't move.

In the second sample test, Mojtaba chooses $p = 17$ and $k = 1$, then the list changes to $[1, 1, 1, 1]$.

In the third sample test, if Mojtaba chooses $p = 17$ and $k = 1$, then Arpa chooses $p = 17$ and $k = 1$ and wins, if Mojtaba chooses $p = 17$ and $k = 2$, then Arpa chooses $p = 17$ and $k = 1$ and wins.