Задача A. Degree Sequence

Имя входного файла:	standard input
Имя выходного файла:	standard output
Ограничение по времени:	2 seconds
Ограничение по памяти:	512 mebibytes

Zebra Hyupo is interested in degree sequences of trees. Hyupo generated a sequence d of length N. Hyupo wonders whether there exists a tree with N vertices such that the degree (the number of edges adjacent to a vertex) of the i-th vertex is d_i. Hyupo asks you to check it.

If such tree does not exist, output "None". If such tree is uniquely determined except for isomorphism (in other words, all such trees are isomorphic), output "Unique". Otherwise output "Multiple".

Two trees T_1 and T_2 are called isomorphic if there exists a bijection f from the set of vertices of T_1 to the set of vertices of T_2 with the following property: for each pair of vertices (u, v) in tree T_1, there is an edge between u and v in T_1 if and only if there is an edge between $f(u)$ and $f(v)$ in T_2.

Формат входного файла

The first line of the input contains N ($2 \le N \le 100$). The second line of the input contains N integers $d_1, \ldots, d_N$ ($1 \le d_i \le N - 1$), separated by single spaces.

Формат выходного файла

Output one of the following strings: "None", "Unique", or "Multiple".

Примеры

standard input	standard output
6 1 1 3 1 3 1	Unique
3 2 2 2	None

Задача B. Frogs

Имя входного файла:	standard input
Имя выходного файла:	standard output
Ограничение по времени:	2 seconds
Ограничение по памяти:	512 mebibytes

There is an infinitely long sequence of cells. For each $i \geq 0$, the beauty of the cell i is equal to $x^i \bmod p$.

Initially k smart frogs (numbered 1 through k) are standing at cell 0, and each of them has happiness equal to 1. Zebra Hyupo found that they move according to the following steps:

1. Frog 1 moves one cell forward, and his happiness increases by the beauty of the cell he enters.

2. For each $i \geq 2$, if Frog $i-1$ moves and if the happiness of Frog $i-1$ is a multiple of m, Frog i will move one cell forward and his happiness increases by the beauty of the cell he enters. Otherwise Frog i does nothing. In this step, Frog 2 moves first, Frog 3 moves next, and so on.

3. If the distance between Frog 1 and Frog k is more than or equal to d, the movement ends. Otherwise, the frogs will repeat moves from step 1.

Compute the position of Frog 1 when they finish the movement.

Формат входного файла

The input contains five integers x ($1 \leq x \leq p-1$), p ($2 \leq p \leq 10^5$), k ($2 \leq k \leq 10$), m ($2 \leq m \leq 10$), and d ($1 \leq d \leq 10^{12}$).

It is guaranteed that p **is a prime**.

Формат выходного файла

Output the position of Frog 1 when they finish the movement.

Примеры

standard input	standard output
1 2 3 2 10	14
58 10007 10 10 123456789012	123456789143

Задача C. Green Triangle

Имя входного файла:	standard input
Имя выходного файла:	standard output
Ограничение по времени:	2 seconds
Ограничение по памяти:	512 mebibytes

There are N points on a plane. No three points are on the same line. Zebra Hyupo decided to choose three distinct points uniformly at random, draw a triangle with these three points, and paint it green. If the area of the triangle is s, the amount of green paint he needs is s milliliters. Compute the expected amount of green paint he needs in milliliters.

Формат входного файла

The first line of the input contains N ($3 \leq N \leq 2\,000$), the number of points. The following N lines are descriptions of points. The i-th of these lines contains two integers x_i and y_i ($0 \leq x_i, y_i \leq 10^9$), separated by a single space. The coordinates of the i-th point are (x_i, y_i). It is guaranteed that no three points are on the same line.

Формат выходного файла

Output the expected amount of green paint Hyupo needs in milliliters. The answer is considered correct if the absolute error or relative error is less than 10^{-9}.

Примеры

standard input	standard output
4 0 0 0 1 1 1 2 0	0.750000000000
10 9 6 5 7 9 2 4 6 3 2 2 1 0 8 7 3 4 8 1 1	9.066666666667

Задача D. MathWorlds

Имя входного файла:	standard input
Имя выходного файла:	standard output
Ограничение по времени:	2 seconds
Ограничение по памяти:	512 mebibytes

Zebra Hyupo is generating problems of a game called MathWorlds. In MathWorlds, the player is given a formula of the form "x [$operator$] $y = z$", and chooses one of the operators "+", "-", "*", or "/" that satisfies the given formula. Hyupo asks you to write a program which validates randomly generated problems.

You are given three integers x, y, and z. Output the operator that satisfies the formula "x [$operator$] $y = z$". If such operator doesn't exist or multiple operators satisfy the given formula, you should output "Invalid" instead. Note that "/" is **exact division (not integer division)**.

Формат входного файла

The input contains three integers x, y, and z ($0 \le x, y, z \le 10^9$), separated by single spaces.

Формат выходного файла

Output one of the following strings: "+", "-", "*", "/", or "Invalid".

Примеры

standard input	standard output
3 2 1	-
2 2 4	Invalid

Задача E. Small Cycles

Имя входного файла:	`standard input`
Имя выходного файла:	`standard output`
Ограничение по времени:	`2 seconds`
Ограничение по памяти:	`512 mebibytes`

Zebra Hyupo has an undirected graph G. It satisfies the following properties:

- G is simple, that is, it contains no self loops or multiple edges.

- G is connected.

- G contains no simple cycles which have length at least 4. A tuple of k distinct vertices v_1, ..., v_k is called a simple cycle of length k if for each i, v_i and v_{i+1} are connected by an edge, and additionally, v_1 and v_k are also connected by an edge.

Return the maximal number of edges Hyupo can add to G, while keeping the properties above. He can add an edge between any pair of vertices.

Формат входного файла

The first line of the input contains two integers V ($1 \le V \le 10^5$) and E ($0 \le E \le 10^5$), separated by a single space. Here, V is the number of vertices of G, and E is the number of edges of G.

The following E lines are the descriptions of edges. The i-th of these lines contains two integers a_i and b_i ($1 \le a_i < b_i \le V$), separated by a single space. Here, a_i and b_i are endpoints of the i-th edge. Vertices are numbered 1 though V. It is guaranteed that G satisfies the properties in the statement.

Формат выходного файла

Output the maximal number of edges Hyupo can add to G.

Примеры

standard input	standard output
7 6 1 2 1 3 1 4 1 5 1 6 1 7	3
9 9 1 2 1 3 2 3 2 4 4 5 5 6 3 7 7 8 8 9	2

Задача F. Swap Balls

Имя входного файла:	`standard input`
Имя выходного файла:	`standard output`
Ограничение по времени:	`2 seconds`
Ограничение по памяти:	`512 mebibytes`

Zebra Hyupo is playing a single player game with boxes and balls. There are three boxes numbered 0 through 2. Initially box 0 contains a red ball (denoted as "R"), box 1 contains a green ball (denoted as "G"), and box 2 contains a blue ball (denoted as "B").

Hyupo will perform the following operations:

- Swap the ball in box 0 and the ball in box 1. He must perform this operation **exactly** p times.

- Swap the ball in box 0 and the ball in box 2. He must perform this operation **exactly** q times.

- Swap the ball in box 1 and the ball in box 2. He must perform this operation **exactly** r times.

Hyupo can perform these operations in any order. For example, if $(p, q, r) = (2, 1, 0)$, he may swap the ball in box 0 and the ball in box 1 first, and then swap the ball in box 0 and the ball in box 2, and then swap the ball in box 0 and the ball in box 1 again. His goal is to reach a particular pattern after these operations. After performing these operations, if the color of the ball in box i matches the i-th character of s, he wins the game.

You are given three integers p, q, r, and a string s. Check whether he can win the game, and output "Yes" or "No".

Формат входного файла

The first line of the input contains three integers p, q, and r, separated by single spaces $(0 \leq p, q, r \leq 10^9)$. The second line contains a string s; it will be a permutation of "RGB", that is, one of the following six strings: "RGB", "RBG", "GRB", "GBR", "BRG", or "BGR".

Формат выходного файла

If it is possible to win the game, output "Yes". Otherwise output "No".

Примеры

standard input	standard output
2 1 0 BGR	Yes
5 8 58 RGB	No

Note

In the first example, Hyupo can first swap the ball in box 0 and the ball in box 2 transforming "RGB" to "BGR", then swap the ball in box 0 and the ball in box 1 getting "GBR", and finally swap the ball in box 0 and the ball in box 1 again to obtain "BGR".