Problem A. Cotree

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Avin has two trees which are not connected. He asks you to add an edge between them to make them connected while minimizing the function $\sum_{i=1}^{n} \sum_{j=i+1}^{n} dis(i,j)$, where $dis(i,j)$ represents the number of edges of the path from i to j. He is happy with only the function value.

Input

The first line contains a number n ($2 \leq n \leq 100,000$). In each of the following $n-2$ lines, there are two numbers u and v, meaning that there is an edge between u and v. The input is guaranteed to contain exactly two trees.

Output

Just print the minimum function value.

Example

standard input	standard output
3 1 2	4

Problem B. Math

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Avin sells robots to clients. At second 0, Avin is at the location $(0,0)$ on a number axis with a robot. He wants to go to $(L,0)$ with the robot. He walks a unit distance per second, and he can only stop at integer coordinates. Now, he decides to follow these walking rules repeatedly until he arrives $(L,0)$ with the robot:

1) If Avin has the robot with himself, the robot may be dropped down with probability p.

2) If Avin had dropped the robot, he will figure it out with probability q. Specially, if Avin arrives at $(L,0)$ without robot, he will turn around immediately.

3) If Avin does not see that the robot had been dropped, he walks one step right; otherwise, he walks left until he is at the same location as the robot.

What is the expectation of walking time he needs to arrive $(L,0)$ with the robot?

Input

One line with three numbers L, p and q, where L ($1 \leq L \leq 100,000$) is an integer, p and q are real numbers with three digits and within $(0,1)$.

Output

Print the expected walking time. Your answer is considered correct if the absolute or relative error doesn't exceed 10^{-6}. Formally, let your answer be a, and the jury's answer be b. Your answer is considered correct if $\frac{|a-b|}{max(1,|b|)} \leq 10^{-6}$.

Example

standard input	standard output
1 0.500 0.500	2.0000000000

Problem C. Trap

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Avin is studying isosceles trapezoids. An isosceles trapezoid is a convex quadrilateral with two opposite parallel bases, two equal-length legs and positive area. In this problem, we further require that the two legs are not parallel. Given n segments, you are asked to find the number of isosceles trapezoids whose 4 edges are from these segments and the greatest common divisor of their lengths is 1. Two congruent isosceles trapezoids are counted only once.

Input

The first line contains a number n ($4 \leq n \leq 2,000$). The second line contains n numbers, each of which represents the length of a segment (the length is within $[2, 10000]$).

Output

Print the number of non-congruent isosceles trapezoids.

Examples

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

Problem D. Wave

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Avin is studying series. A series is called "wave" if the following conditions are satisfied:

1) It contains at least two elements;

2) All elements at odd positions are the same;

3) All elements at even positions are the same;

4) Elements at odd positions are NOT the same as the elements at even positions.

You are given a series with length n. Avin asks you to find the longest "wave" subseries. A subseries is a subsequence of a series.

Input

The first line contains two numbers n, c ($1 \le n \le 100,000, 1 \le c \le 100$). The second line contains n integers whose range is $[1, c]$, which represents the series. It is guaranteed that there is always a "wave" subseries.

Output

Print the length of the longest "wave" subseries.

Example

standard input	standard output
5 3 1 2 1 3 2	4

Problem E. Packing

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Avin's warehouse has a packing line with m outlets. There are n goods in total, which aren't on the packing line. And the $i - th$ good will be sent to the x_i outlet at time t_i. In each second, Avin can send at most one good from one outlet to the packing line. For outlet i, there is an associated buffer with size a_i, and goods can be placed in the buffer. However, at the end of each second, if the number of goods b at the outlet is greater than a_i, Avin has to pay the utilization fee $b - a_i$. Since Avin wants to save money, he asks you to find a plan to send all the goods to the packing line with minimum utilization fee. In order to finish today's work, Avin must send all goods to the packing line. Goods arrived at time t_i can be sent to the packing line immediately at time t_i.

Input

The first line contains two integers n and m $(1 \leq n, m \leq 1,000,000)$. In the following n lines, each of which contains two numbers t_i $(1 \leq t_i \leq 1,000,000)$ and x_i $(1 \leq x_i \leq m)$. In the next following line, there are m integers containing a_i $(1 \leq a_i \leq 1,000,000)$.

Output

Print the minimum utilization fee.

Example

standard input	standard output
10 2 1 1 1 1 1 1 1 1 1 1 1 2 1 2 1 2 1 2 1 2	21

Problem F. String

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Avin has a string. He would like to uniform-randomly select four characters (selecting the same character is allowed) from it. You are asked to calculate the probability of the four characters being "*avin*" in order.

Input

The first line contains n ($1 \le n \le 100$), the length of the string. The second line contains the string. To simplify the problem, the characters of the string are from 'a', 'v', 'i', 'n'.

Output

Print the reduced fraction (the greatest common divisor of the numerator and denominator is 1), representing the probability. If the answer is 0, you should output "0/1".

Examples

standard input	standard output
4 avin	1/256
4 aaaa	0/1

Problem G. Traffic

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Avin is observing the cars at a crossroads. He finds that there are n cars running in the east-west direction with the $i-th$ car passing the intersection at time a_i. There are another m cars running in the north-south direction with the $i-th$ car passing the intersection at time b_i. If two cars passing the intersections at the same time, a traffic crash occurs. In order to achieve world peace and harmony, all the cars running in the north-south direction wait the same amount of integral time so that no two cars bump. You are asked the minimum waiting time.

Input

The first line contains two integers n and m ($1 \leq n, m \leq 1,000$). The second line contains n distinct integers a_i ($1 \leq a_i \leq 1,000$). The third line contains m distinct integers b_i ($1 \leq b_i \leq 1,000$).

Output

Print a non-negative integer denoting the minimum waiting time.

Examples

standard input	standard output
1 1 1 1	1
1 2 2 1 3	0

Problem H. Rng

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Avin is studying how to synthesize data. Given an integer n, he constructs an interval using the following method: he first generates a integer r between 1 and n (both inclusive) uniform-randomly, and then generates another integer l between 1 and r (both inclusive) uniform-randomly. The interval $[l, r]$ is then constructed. Avin has constructed two intervals using the method above. He asks you what the probability that two intervals intersect is. You should print $p \cdot q^{-1}(MOD\ 1,000,000,007)$, while $\frac{p}{q}$ denoting the probability.

Input

Just one line contains the number n $(1 \le n \le 1,000,000)$.

Output

Print the answer.

Examples

standard input	standard output
1	1
2	750000006

Problem I. Budget

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Avin's company has many ongoing projects with different budgets. His company records the budgets using numbers rounded to 3 digits after the decimal place. However, the company is updating the system and all budgets will be rounded to 2 digits after the decimal place. For example, 1.004 will be rounded down to 1.00 while 1.995 will be rounded up to 2.00. Avin wants to know the difference of the total budget caused by the update.

Input

The first line contains an integer n ($1 \le n \le 1,000$). The second line contains n decimals, and the $i - th$ decimal a_i ($0 \le a_i \le 10^{18}$) represents the budget of the $i - th$ project. All decimals are rounded to 3 digits.

Output

Print the difference rounded to 3 digits..

Examples

standard input	standard output
1 1.001	-0.001
1 0.999	0.001
2 1.001 0.999	0.000

Problem J. Worker

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Avin meets a rich customer today. He will earn 1 million dollars if he can solve a hard problem. There are n warehouses and m workers. Any worker in the $i - th$ warehouse can handle a_i orders per day. The customer wonders whether there exists one worker assignment method satisfying that every warehouse handles the same number of orders every day. Note that each worker should be assigned to exactly one warehouse and no worker is lazy when working.

Input

The first line contains two integers n ($1 \leq n \leq 1,000$), m ($1 \leq m \leq 10^{18}$). The second line contains n integers. The $i - th$ integer a_i ($1 \leq a_i \leq 10$) represents one worker in the $i - th$ warehouse can handle a_i orders per day.

Output

If there is a feasible assignment method, print "Yes" in the first line. Then, in the second line, print n integers with the $i - th$ integer representing the number of workers assigned to the $i - th$ warehouse. Otherwise, print "No" in one line. If there are multiple solutions, any solution is accepted.

Examples

standard input	standard output
2 6 1 2	Yes 4 2
2 5 1 2	No

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Problem K. Class

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	256 megabytes

Avin has two integers a, b $(1 \le a, b \le 1,000)$.

Given $x = a + b$ and $y = a - b$, can you calculate $a * b$?

Input

The first line contains two integers x, y.

Output

Print the result of $a * b$.

Example

standard input	standard output
4 2	3

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