Problem A. Arithmetics Problem

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

You are given the positive integer n. Find the minimum positive integer k such that n **is not** divisible by k.

Input

Input consists of the only integer n ($1 \le n \le 10^9$).

Output

Output the only integer, the minimum positive integer k that is not a divisor of n.

Example

standard input	standard output
22	3
4	3
2017	2

Problem B. Building a Quadrangle

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

You are given four sticks of integral length.

Check if it is possible to build the quadrilateral that has an inscribed circle using these sticks as sides. It is not allowed to break sticks.

Input

The only line of the input contains four positive integers, the lengths of the sticks. All stick lengths are not larger than 10^9.

Output

Print "Yes", if it is possible to build a quadrilateral that has an inscribed circle using given sticks as sides, or "No" otherwise.

Example

standard input	standard output
1 2 3 4	Yes
1 2 4 8	No

Problem C. Circea and Cyclops

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Circea owns the shop of contact lenses in the Cyclops country. She collects the orders from cyclops for the lenses (note that cyclop has only one eye, so he needs only one lense), and orders the lenses from the vendor. If lense with optical power of k diopters is recommended to a cyclop, it is safe to use lenses of power $k-1$ or $k+1$ as well.

Circea receives the lenses from the vendor, who sells lenses of any integer optical power, but only in pairs of lenses of the same optical power. Circea wants to buy the least number of pairs of lenses to fulfill all orders she have.

Input

First line of the input contains one integer n ($1 \le n \le 2500$), number of orders from the cyclops. Second line contains n integers l_i ($-1000 \le l_i \le 1000$) — recommended optical power of lense.

Output

Print one integer — minimum number of pairs of lenses Circea needs to buy to fulfill all orders from cyclops.

Example

standard input	standard output
5 -2 1 -1 0 0	3
4 -3 6 3 0	4

Problem D. Double Conversion

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Given the sequence of integers $x_1, x_2, \ldots x_n$. You are allowed to do the only kind of operations: choose an integer x_k and increment x_k and also the elements of the sequence that are adjacent to x_k (if they exist).

For example, if $n = 5$ and you are applying the operation to x_3, then you increment x_2, x_3 and x_4 by 1; if you are applying the operation to x_5, then you increment x_5 and x_4, since x_6 does not exists.

Find the minimum number of operations you have to do to convert all sequence to odd numbers and minimum number of operations you have to do to convert all sequence to the even numbers.

Input

First line of the input contains one integer n ($1 \le n \le 10^6$). Second line contains n integers x_i in order they appear in the sequence ($1 \le x_i < 2^{31}$).

Output

In the first line of the output print one integer representing the minimum number of operations that you have to do to convert all elements of the sequence to odd numbers, or -1 if it is impossible.

In second line print answer on the same question for conversion to even numbers.

Example

standard input	standard output
4 5 6 7 4	3 3

Problem E. Points and Circles

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

You are given w white and r red points on the plane. Your task is to select three white points with next property: they form a non-degenerate triangle such that circumscribed circle of this triangle contains maximum possible number of red points inside.

Input

First line of the input contains one integer w ($3 \le w \le 200$), number of white points.

Each of next w lines contains two integers x_i and y_i ($-10^4 \le x_i, y_i \le 10^4$), coordinates of the i-th white point.

Then follows the integer r ($1 \le r \le 200$), the number of red points.

Then r lines follow, describing the red points in the similar format. given ($1 \le w, r \le 200$, $-10^4 \le x_i, y_i \le 10^4$).

It is guaranteed that no two points in the input coincide.

It is also guaranteed that there exists at least one triple of non-collinear white points, and that no red point belongs to a border of circumscribed circle for a triangle consisting of three white points.

Output

Print one integer — maximum number of red points inside the circumscribed circle of triangle formed by three white points.

Example

standard input	standard output
4 1 1 1 3 3 3 4 4 2 2 2 100 100	1
4 3 5 0 1 5 1 7 1 3 2 3 4 4 99 99	2

Problem F. Cable Management

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Byteasar is a system administrator at the big conference. He was tasked to supply $r_1, r_2, \ldots, r_n$ Ethernet patchcords for the participants during n consecutive days.

Unluckly, participants are inaccurate so they return each patchcord not in ideal condition (broken jacks or either damaged cable). So Byteasar can either buy new patchcord at the shop for c_n bytaler each, or submit patchcords for repair to the Bytelecom service, which takes t_f days and costs c_f bytelars for each patchcord (i.e. if Byteasar submits a patchcord by the end of the day i, he will receive it back at the beginning of day $i + t_f$). He may also repair patchcord by himself, which takes $t_s > t_f$ days and costs $c_s < c_f$ bytalers for each patchcord. At the end of each day, Byteasar needs to make a decision about how many patchcords to send to Bytelecom, how many to repair by himself, and how many to discard and replace with brand new.

By the beginning of the i-th day, the total number working patchcords that can be obtained from repair, plus new patchcords that need to be purchased, plus working patchcords unused during the previous day should be no less than r_i.

Bytiana, the manager of the conference, asked you to calculate the minimum amount of bytalers needed to supply the conference the appropriate quantity of patchcords according to supply plan. Note that at the beginning of the process Byteasar have no patchcords.

Input

Input consists of two lines. First line contains six numbers n, c_n, c_f, c_s, t_f, t_s ($1 \le n \le 100$, $0 \le c_n, c_f, c_s \le 10$, $1 \le t_f, t_s \le n$). The numbers n, t_f, t_s are integers, and c_n, c_f, c_s are real numbers given with at most two digits after decimal point.

The next line contains n integers $r_1, r_2, \ldots, r_n$ ($0 \le r_i \le n$).

Output

Print the minimal amount of bytalers necessary to ensure supply plan with absolute error 10^{-2} or better.

Example

standard input	standard output
3 9 7 4 2 3 3 5 2	86.00