Internet Olympiads, Season 2023-2024, First Team Olympiad

Statement is not available on English language

A. Miles' escape

4 seconds, 256 megabytes

Miles escapes from Miguel O'Hara again, but this time he's managed to bring along a device to travel between two worlds. Unfortunately, his movements are limited to one city
in each world. But these two cities are very similar: each has exactly n skyscrapers located at the same points in space.

Some pairs of skyscrapers located in the same world are suitable to stretch a web between them and the
move from one to the other (in either of the two directions). B
the first world has exactly m_1 such pairs of skyscrapers, and the second world has exactly m_2 . It is known how long it takes to move between the available pairs of skyscrapers in each world. In addition, Miles can, being on the $i\text{-}th$ skyscraper in the first world,
move to the i-th skyscraper in the second, and vice versa, in x seconds.

Miles is going to meet his team at skyscraper number $t\ of$ the second world, while starting his escape from skyscraper number s of the first world. Help Miles and tell him how fast he can meet up with his team to stand a chance against the
Miguel.

Input data

The first line of input contains two integers n and x - the number of skyscrapers in each of the two worlds and the travel time between the corresponding skyscrapers of different worlds ($1 \le n \le 10^5$; $1 \le x \le 10^6$).

The second line contains a number m_1 - the number of pairs of skyscrapers between which you can move in a first-world city ($0 \le m_1 \le 10^6$).

The next m_1 lines each contain three numbers u_i , v_i , and c_i , meaning that it is possible to move between skyscrapers u_i and v_i in the first world in any direction in c_i seconds ($1 \le u_i, v_i \le n; 1 \le c_i \le 10^6$).

The following lines contain information in the same format about possible movements between the skyscrapers of the second world: the first of these lines contains the number m_2 , and the next m_2 lines contain the descriptions of the movements themselves (as triples of the numbers u_i , v_i and c_i).

The last line contains two integers s and t - the number of the starting skyscraper in the first world and the ending skyscraper in the second world ($1 \le s, t \le n$).

Output data

Output a single integer - minimum time
traveling between skyscraper $s\ of$ the first world and skyscraper t of the second world, or `-1` if there is no path between them.

входные данные
6 2 7 1 3 2 6 4 1 4 1 5 5 3 2 1 2 1 1 5 4 2 3 4 6 4 2 1 2 1 5 5 2 3 3 1 5 1 5 4 2 6 1 5 6
выходные данные
6

Statement is not available on English language

B. Catching spiders

1 second, 256 megabytes

You have joined the side of evil and now work for Alchemax!

The Alchemax lab has started to capture spiders from other universes. But this was not an easy task, because each spider still needs to be fed. The labs make special food for this purpose, but making food for spiders from different universes is a very expensive endeavor.

Researchers have found that for surgery to be successful:

1. first, it is necessary to prepare in advance a certain number of portions of feed m, and then give one portion of this feed to the laboratory for analysis;
2. then **equally** distribute the remaining m - 1 portions of food among the spiders (each spider should receive an integer number of food portions);
3. there should be no feed left at the end, as disposing of it will attract unnecessary attention.

That said, to maximize spider comfort, you want to allocate as many feed portions to each spider as possible. However, due to budget constraints, it is not possible to prepare
more than n servings.

Catching spiders does not always go well, so you know only that after today's operation there will be between 1 and k spiders in the lab. Determine the maximum amount of food that is not
exceeding n, so that for any number of spiders caught today, you can give one portion to the lab and distribute the remainder equally among the spiders. It is allowed not to feed the spiders at all (but only if you do not feed any of them).

Input data

The only input line contains two integers n and k - the maximum number of food and spiders caught, respectively ($1 \le n, k \le 10^{18}$).

Output data

Output a single number m - the largest amount of feed you can prepare to fulfill all conditions.

входные данные
5 2
выходные данные
5

входные данные
10 3
выходные данные
7

Statement is not available on English language

C. Jumping between universes

2 seconds, 256 megabytes

There are special portals for traveling between universes in *Spider Worlds*. A network of m portals for n universes is a graph with n vertices and m edges. Each portal
connects some two universes, and no two portals connect the same pair of universes.

Miguel O'Hara uses his high-tech portal clock to move around. But the earliest versions of this clock weren't that advanced, and didn't allow for immediate
to travel to arbitrary universes. Namely, the clock had an *energy level* parameter that was initially equal to 0.

Each portal is characterized by some characteristic w - the minimum value of the energy level required for the
to use this portal. If the energy level value of the clock is less than w, you cannot use this portal now. K
fortunately, there is a way to increase the energy level: **the first time you enter the** universe i, the energy level of the watch is **permanently** increased by a_i.

Miguel wondered what the maximum energy level value he could get on the old prototype watch would be if he visited all the universes he could get to, starting his journey from the
of universe number s? Help him answer this question.

Input data

The first line of input data gives three integers n, m, and s - the number of universes, the number of portals between these universes, and the number of the universe from which Miguel starts his movements ($1 \le s \le n \le 10^5$; $1 \le m \le 2 \cdot 10^5$).

The second line of input data lists n integers a_i through a space - the values by which the energy level of the clock increases on the first visit to each universe ($1 \le a_i \le 10^9$).

The following m lines describe the portals. The description of portal number i contains three integers u_i, v_i and w_i, and defines a portal between universes u_i and v_i, to use which it is necessary to have clock strength at least w_i ($1 \le u_i, v_i \le n; 0 \le w_i \le 10^9$).

The graph of connections between universes does not contain multiples of edges and loops, but is not necessarily connected.

Output data

In the single stack print one integer - the maximum value of the energy level of the clock that Miguel can get.

входные данные
5 4 1 1 1 1 1 1 1 2 2 1 3 1 1 4 3 1 5 5
выходные данные
4

входные данные
4 3 1 3 2 1 10 1 2 3 2 3 5 1 3 4
выходные данные
6

Statement is not available on English language

D. Intelligence test

1 second, 256 megabytes

The Spider Community has a special machine that sends trapped people from other worlds to their home dimensions. However, not everyone knows how it works: even setting it up is a monstrously complicated endeavor.

In order to correctly customize this machine, you first have to confirm that you have enough skills to do the customization. And to find out, before customization, after each restart this machine offers you a small intelligence test.

The rules of the test are very simple: you are given a positive integer n, after which you must name a string s of lowercase Latin letters from 'a' to 'z' of length exactly n. Once you have named this
string, the machine performs the following actions:

1. First, the number of unique letters in the string s is calculated, we denote it by k.
2. Then each letter of the alphabet used in s is assigned a "weight" - a unique integer from 1 to k. Let us denote this "weight" of a letter c by $w(c)$.
3. Then the following quantity is calculated: $T = \sum_{c \in s} w(c)$, in other words - the weights of all letters in the named string are summarized.

Of course, the machine assigns weights to the letters so that the final sum is as small as possible. For example, if you name a string "aba", the machine will assign weight 1 to 'a' and weight 2 to 'b', and then the final value will be $1 + 2 + 1 = 4$.

Given n, name any string of length n that allows the maximum possible value of the specified quantity T.

Input data

A single line of input is given an integer n - the length of t h e string you are to name ($1 \le n \le 10^5$).

Output data

Output a string of n letters of the Latin alphabet from 'a' to 'z', which allows you to get the maximum possible value of T after
evaluation by the machine. If there are several possible answers, output any of them.

входные данные
3
выходные данные
abc

Statement is not available on English language

E. Rectangular Spot

1 second, 256 megabytes

Not many people know, but the Lego universe has its own supervillain named Blur. Only he is not so famous, because he can create not beautiful oval "holes" in the fabric of reality, but only boring rectangular ones.

Nevertheless, like the Blur we know, it seeks to increase its power. To do this, it tries to create as many "holes" as possible, nested in pairs, so that it can absorb the energy of a large number of colliders from other universes at once with the help of the resulting mega-portal.

Now he already has n rectangular "holes" located in one plane. Their sides are parallel to the coordinate axes, and these
"holes" can be

- to move and overlap;
- rotate by 90° within their common plane (that is, swap their height and width).

Determine what is the maximum number of "holes" in the sequence that can be composed so that each following
"hole" was nested in the previous one. We consider that a "hole" of size (h_1, w_1) can be nested into a "hole" of size (h_2, w_2) if $h_1 \le h_2$ and $w_1 \le w_2$.

Input data

The first line of input gives an integer n - the number of rectangular "holes" from which we want to make a sequence of nested ones ($1 \le n \le 10$).^{5}

In the i-th of the following n lines two integers are written through a space h_i and w_i are the height and width of the i-th "hole" ($1 \le h_i, w_i \le 10$).^{9}

Output data

In the first stack, take out the maximum number of "holes" that can be consistently nested within each other.

In the second line print their numbers in 1-numbering, in order from smallest to largest, through a space.

If there is more than one answer choice, output any of them.

входные данные
5 1 1 3 2 2 5 4 1 3 5
выходные данные
4 1 4 3 5

входные данные
5 1 10 2 9 3 8 4 7 5 6
выходные данные
1 1

In the example, you can rotate the fourth rectangle by 90°, and you will get a sequence of rectangles with dimensions $(1, 1)$, $(1, 4)$, $(2, 5)$ and $(3, 5)$. It is easy to see that each previous rectangle can be nested into the next one, and the sequence is obtained
a longer length with the same property will not work.

Statement is not available on English language

F. Gwen's resting

1 second, 256 megabytes

Gwen is traveling between worlds again, but since she is no longer on Miguel's team, she uses the portal clock she received from Hobie. Her old portal clock, however.
are blocked, but that doesn't mean they're useless - there's a fun game on them to kill time with when there's nothing to do.

The game starts with a rectangle of size $n \times m$ and proceeds as follows:

- Gwen is the first to go. She can choose any side of the rectangle and increase it by 1. After this action, she will get points equal to the change in the area of the rectangle.
- After that, the computer built into the watch follows the same rules.

In total, Gwen and the algorithm make k moves each, i.e., the total number of moves is $2k$. Both Gwen and the computer always make their moves optimally.

But still soon Gwen will have to go in search of Miles, and you don't want to leave the game unplayed. Help Gwen and calculate who will win in such a game, and how many points more will be at the
the winner.

Input data

In the first input line, two integers n and m are given - the original dimensions of the rectangle ($1 \le n, m \le 10$).^{9}

The second line contains a single number k - the number of available moves for each side ($1 \le k \le 10$).^{9}

Output data

If Gwen wins, print the number 1; if more points
If the computer scores, print the number 2. In case of a draw, print the number
0.

After that, print a non-negative integer - the difference in points between the winner and the loser.

входные данные
3 3 5
выходные данные
2 5

входные данные
10 3 2
выходные данные
0 0

Statement is not available on English language

G. Spider-Man Noir and the Rubik's Cube.

1 second, 256 megabytes

Let's digress a bit from the second part of the story and remember the first one. Spider-Man Noir was very interested in the Rubik's Cube, and decided to solve all the mysteries of this mysterious object by all means. But here's the problem - so far he has not been able to find out what this strange device is, and what its purpose is.

So he decided to practice on a black-and-white version of the Rubik's cube, and a two-dimensional one at that, instead of a three-dimensional one. For this purpose, he took a checkered table of size $n \times m$, each cell of which
is colored either black or white. As in a Rubik's cube, the colors of the elements can be changed, but instead of rotating, you can do one of two operations with this table:

- invert all colors in any column; invert all colors in any row.
-

The ultimate goal is to ensure that there is a "path" of black cells from the top left corner of the table to the bottom right corner with steps one to the right and steps one down. In other words, there should be such a sequence of black cells as follows
$(r_1, c_1), (r_2, c_2), \ldots, (r_{n+m-1}, c_{n+m-1})$, that

- (r_1, c_1) is equal to $(1, 1)$, that is, the upper left cell;
- (r_{n+m-1}, c_{n+m-1}) is equal to (n, m), that is, the bottom right
- cell; and for any two neighboring cells in this sequence (r_i, c_i) and (r_{i+1}, c_{i+1}), either $r_i = r_{i+1}$ and $c_{i+1} = c_i + 1$, or, conversely, $c_i = c_{i+1}$ and $r_{i+1} = r_i + 1$.

Determine the minimum number of actions required to obtain such a path, or say that obtaining such a path from the
of black cells is impossible. Spider-Man Noir is counting on your help.

Input data

In the first input line, two integers n and m - the height and width of the table ($1 \le n, m \le 2000$) - are given through a space.

The i-th of the following n rows contains m symbols, each of which is equal to '0' or '1' - designations of colors of cells in the i-th row of the table.
The symbol '0' means white color and '1' means black color.

Output data

If it is impossible, by inverting rows and columns, to get a black path from the top left cell of the table to the bottom right cell, print the single number -1.

Otherwise, in the first line print two integers r and c through a space - the number of inverted rows and columns, respectively. After that, in the second line print r numbers through a space
inverted rows, and in the third row - c numbers of inverted columns.

Rows and columns are numbered from 1 (rows - from top to bottom, columns - from left to right). You can display row and column numbers in any order. Among all answers minimizing $r + c$, you can choose any answer.

входные данные
2 2 10 01
выходные данные
1 1 1 1

входные данные
4 4 1111 0001 0001 0000
выходные данные
1 0 4

входные данные
3 5 10000 01010 00001
выходные данные
2 1 2 1 1

Statement is not available on English language

H. Quantum hole

1 second, 256 megabytes

Quantum holes destroying universes can sometimes be found to "mend", thus stopping the destruction of the world. But this is not always possible.

Miguel came up with a way to estimate the danger of a quantum hole by an integer. To do this, the information about a quantum hole is first represented as a bit string of length exactly n. Each of its
substring t (a sequence of consecutive bits) of length k makes its independent contribution $\text{danger}(t) = d_t$ to the total hole hazard, namely:

$$\text{danger}(s) = \sum_{i=1}^{n-k+1} \text{danger}(s)_{,i,\ldots,i+k-1}$$

where $s_{i,\ldots,i+k-1}$ means substring s *of* length k with the beginning in the i-th bit.

The hazard values of all binary strings of length k have already been studied and are known, in total there are 2^k such values. For example, for $k = 2$ you know 4 values: d_{00}, d_{01}, d_{10}, d_{11}.

Today Margo Kess was bored and came up with the idea of finding a description

of the safest quantum hole. Find a bit string of length exactly n, the danger of which is minimal.

Input data

The first line of input data contains two numbers n and k - the length of the searched string and the length of substrings, respectively ($1 \le n \le 1000, 1 \le k \le 10$).

The second line lists 2^k numbers through a space: $d_{00...00}$, $d_{00...01}$, $d_{00...10}$, ..., $d_{11...10}$ and $d_{11...11}$ are the hazard levels of all possible bit strings of length k in lexicographic order ($1 \le d_t \le 1000$).

Output data

As an answer, output the least dangerous string of length n. If there are several such strings, you can output any of them.

входные данные
7 2 4 2 1 3
выходные данные
1010101

входные данные
5 3 8 5 4 6 3 5 6 7
выходные данные
01001

входные данные
5 3 486 750 753 40 798 644 599 56
выходные данные
01111

входные данные
5 2 358 906 7 859
выходные данные
10000

In the first example, the hazard of the resulting string is equal to $d_{10} + d_{01} + d_{10} + d_{01} + d_{10} + d_{01}$, i.e. $3 \cdot (d_{10} + d_{01}) = 3 \cdot (1 + 2) = 9$. Note that this is not the only possible answer with this hazard rate.

In the second example, the hazard of the resulting string is equal to $d_{010} + d_{100} + d_{001} = 4 + 3 + 5 = 12$.

In the fourth example, the hazard of the resulting string is equal to $c_{10} + 3 \cdot c_{00} = 1081$.

Statement is not available on English language

I. Stabilization of the multiverse

2 seconds, 256 megabytes

Anomalies are very dangerous in that they can alter the natural course of events, and even interfere with *key events*, with potentially irreversible consequences for many universes.

Since the Blur appeared on *Earth-2099*, it has disrupted so many key events that as many as n neighboring universes are threatened: the web of the multiverse is unraveling. And it's up to you

fix it!

In order to stabilize the universes in which quantum holes have opened, it is necessary to reconnect them together by letting cosmic energy flows between them. It is known that:

1. some pairs of universes are connected **by one-way** energy channels;
2. there are exactly two channels coming out of each of the n universes;
3. there are exactly two channels to each of the n universes;
4. each channel is characterized by a pair of numbers a and b, which mean that the power of energy launched through this channel must lie between a and b inclusive.

You need to choose exactly n channels so that they form a circulation of energy affecting each of the n universes. In other words, these n channels should form several (one or more) cycles, passing in aggregate through all n universes.

At the same time, the power of energy supplied to each selected channel must be the same (even if the channels are on different cycles). More formally, there must exist such a power value w that on each selected channel $a_i \le w \le b_i$.

Determine if you can select such channels, and such a power value, that all the required conditions are met. Save the Multiverse!

Input data

In the first input line, a single integer n - the number of universes under consideration ($3 \le n \le 10^5$) - is given.

The next $2n$ lines list the energy channels: first there are two channels coming from Universe number 1, then two channels coming from Universe number 2, and so on. The description of each channel is given by three integers t_i, a_i and b_i - the number of the universe to which it leads, and restrictions on the power of the energy flowing through it ($1 \le t_i \le n$; $1 \le a_i \le b_i \le 10$).^{5}

It is guaranteed that there are exactly two channels leading to each universe. No channel connects a universe to itself, but there can be two channels between the same universes.

Output data

In the first line print a single number -1 if there is no way to select a circulation of one power.

Otherwise - print in the first line the required value of energy power w. Then in the second line print exactly n integers with a space - the numbers of the selected channels (from 1 to $2n$) in the order of their succession in the input.

If there are several suitable answers, print any of them.

входные данные
3 2 1 3 3 4 5 3 2 4 1 1 5 1 3 5 2 6 7
выходные данные
3 1 3 5

входные данные
5 2 3 6 3 4 6 5 4 8 5 7 8 4 1 6 1 2 4 2 2 9 3 5 7 4 1 3 1 5 8
выходные данные
6 1 3 5 8 10

In the first example, channels numbered 1, 3 and 5 are selected. The first one leads from the universe number 1 to the universe number 2 and has energy constraints $[1, 3]$. Similarly, the third one comes from the universe 2 into universe 3 with constraints $[2, 4]$, and the fifth leads from universe 3 into universe 1 with constraints $[3, 5]$. We obtain the cycle $1 \to 2 \to 3 \to 1$, passing through all universes, through each channel of which energy with the power of 3 can be let in.

In the second example we get two cycles $1 \to 2 \to 5 \to 1$ and $3 \to 4 \to 3$. Power 6 can be let through each of the selected channels.

Statement is not available on English language

J. Cobwebs in all directions

1 second, 256 megabytes

Several Spiders try to stop Alchemax from collapsing, but Blur gets in their way. Indeed, the more chaos, the easier it will be for him to escape, as Gwen, Miles, Hobie and Pavitr will be busy saving the people around them.

To visualize the situation better, consider the top view, and say that the Spiders are located on the plane at point c $(0, 0)$ is right in the heart of Alchemax, and the walls of the building. "Alchemax" represent a circle of radius 10^6 centered at the same point $(0, 0)$.

To keep the walls of Alchemax from collapsing outward after the next collider run, the Spiders use a new kind of web to contain it: a continuous web. It's propagates from the point $(0, 0)$ as light - in each direction to an arbitrarily far distance. And to prevent them, the Blur has placed n *of* its "holes in space" around them. Each hole is is an "absolutely black" round object, that is, each such hole completely absorbs everything that falls into it.

In other words, from the point $(0, 0)$ rays of the web go out in all directions, but if there is a hole in space on the path of a ray, the ray will not go further than it. Your task is to determine which part of the circumference of the "Alchemax" walls the spider's web will reach.

Input data

The first line gives an integer n - the number of holes in the space around the Spider team ($1 \le n \le 10$).^{5}

In the next n lines their description is given. Each hole is represented by a circle in the plane and is given by three integers x_i , y_i and r_i - coordinates of its center and radius ($1 \le |x_i|, |y_i|, r_i \le 10^5$). Holes can overlap each other.

It is guaranteed that the point $(0, 0)$ is not contained inside or on the boundary of any of the holes.

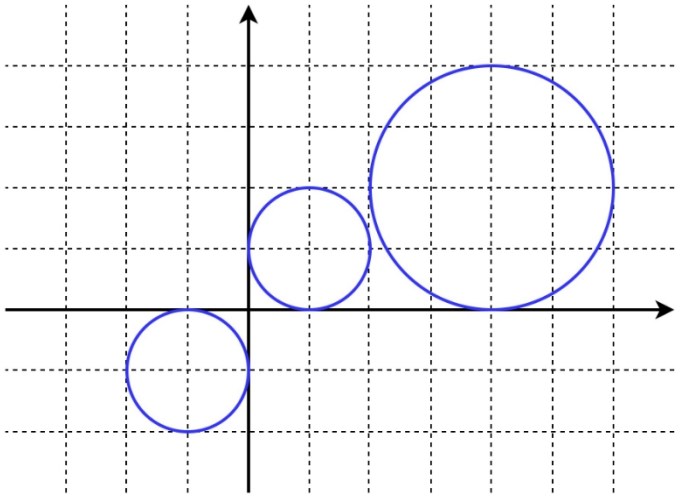
Output data

Output one fractional number from 0 to 1 - the fraction of a large circle that the spider web reaches without encountering a hole along the way. Your answer will be counted if the error does not exceed 10 .$^{-4}$

входные данные
3 1 1 1 4 2 2 -1 -1 1
выходные данные
0.5000000

входные данные
2 4 0 1 0 3 1
выходные данные
0.8113959

Illustration for the first test in the example. The rays will propagate to a great distance only to the upper left and lower right quarters, i.e. exactly half of the distant circle.



Statement is not available on English language

K. Hierarchy of the Spider Community

1 second, 256 megabytes

In the Spider Community, there is a clear hierarchy of who reports to whom. Of course, this does not mean that any of the Spider-Men are less or more important than others, but during operations to save the multiverse, it is important that someone is responsible for coordinating the participants in the operation.

There are a total of n Spiders in the community, and its hierarchy is a suspended tree. The root of this tree is spider number 1, Miguel O'Hara. The hierarchy itself is given by n - 1 ties of direct subordination between members of the community. We will say that Spider number u is a "mentor" of Spider v if there is a direct subordination link between them, and u is located closer to Miguel in the hierarchy than v. In this case, we will call v "subordinate" u.

After Miles' appearance in the community, and his escape, the members of the
communities have split into two groups, each with a different understanding of how they should proceed. Let's call these two available opinions A and B. Let's call the *disorder* in the community
is the number of pairs u and v such that Spider number u is the mentor of Spider number
v (and v, respectively, is a subordinate of u), and thus Spider has the number of
u has opinion A, and spider number v has opinion B.

Miguel really wants to know which of his allies hold what opinion, but he doesn't have time to take a poll.
Help him determine the possible distribution of opinions in the community if it is known that the **disorder in the community is currently the maximum possible**.

Input data

The first line of input gives a single integer n - the number of Spider-Men in the "Spider Community" ($1 \le n \le 10$).^{5}

In the next n - 1 lines there are two integers a_i and b_i each, which mean that there is a direct subordination relation between Spiders a_i and b_i ($1 \le a_i, b_i \le n$). It is not necessary that a_i is a mentor of b_i , it can be vice versa.

It is guaranteed that the set of links forms a tree.

Output data

In the first line print two integers through a space - the maximum possible value of disorder d in such a hierarchy, and k - the number of Spider-Men holding opinion A.

On the second line, list k different numbers from 1 through a space. up to n are the numbers of Spiders holding opinion A.

If there are several possible answers with the maximum value of d, output any of them.

входные данные
3 1 2 2 3
выходные данные
1 1 2

входные данные
4 1 2 1 3 1 4
выходные данные
3 1 1

входные данные
8 1 2 1 3 2 8 3 4 3 5 3 6 5 7
выходные данные
4 2 2 3

Statement is not available on English language

L. Hack the collider

1 second, 256 megabytes

It's an interjective task.

Miles continues to fight Alchemax. His task this time is to hack into the collider's settings to stop it from restarting.

The collider has a total of n settings a_i with numbers from 1 to n, each being a positive integer. Company
has provided protection of settings from outsiders, so it is impossible to find out the value of a certain setting directly. However, anyone can request some $f(x)$ equal to the value of
settings with the number cyclically shifted from x by c forward ($0 \le c \le n$ - 1), that is, with number $x + c$ if $x + c \le n$, and $x + c$ - $n + 1$ otherwise.

Miles found out that the settings are actually ascending, i.e. that $a_{i+1} > a_i$ for all i from 1 to n - 1. Now, to stop the collider, Miles must necessarily find a number known only to the Alchemax staff, c - the shift in numbers used in the system of access to the settings.

Find the value of c if you are given a number n and the ability to query the values of $f(x)$ no more than 42 times.

Input data

The first line contains one integer n - the number of settings ($1 \le n \le 10^5$).

It is also guaranteed that all a_i - integers from 1 to 10^9 inclusive.

Interaction protocol

Interaction with the interactor takes place in the form of requests from your program and responses from the interactor.

You can request the value of $f(x)$ no more than 42 times for a $1 \le x \le n$. To request the next value, print on a separate line "? x", where instead of x you specify the desired number. If you have not exceeded the limit of 42 "?" queries, on the next line the interactor will print a single integer $f(x)$ equal to a_{x+c} if $x + c \le n$ or $a_{x+c-n+1}$ otherwise.

To print the answer to the problem, type "! c", where instead of c should be the shift value ($0 \le c \le n$ - 1). Output
of the response is not counted in the number of requests. After outputting the response, your program should terminate with a null return code.

If at any point your program exceeds the limit of 42 requests, the interactor will print -1 on the next line and terminate with a WA (Wrong Answer) verdict. To avoid getting a RE, TL or IL verdict after reading a -1 response, your program should
will terminate with a null return code.

Remember to flush the output buffer after each request so that the interactor receives your request. This can be done with `std::cout.flush()` in C++, `System.out.flush()` in Java, and `sys.stdout.flush()` in Python, as well as by the similar commands in other languages. If your program does not reset the output buffer, it will get a TL or IL verdict.

входные данные
5 4 5 1

выходные данные
? 1 ? 2 ? 3 ! 3

входные данные
5 4 3 2 1

выходные данные
? 4 ? 3 ? 2 ? 1 ! 0