Problem A
Add 'Em Up!
Time Limit: 1 Second

From the 2019 ICPC Northeast North America Regional Programming Contest

Simon is a contestant on the new exciting game show, Add 'Em Up! In this show, contestants are given a set of cards with numbers on them and need to select two cards that add up to a given sum. However, to make things more interesting, the font that the cards are printed in (see below) means that certain cards will display different numbers if turned upside-down, and it is legal to turn either or both of the cards if necessary to generate the sum. Please help Simon win the game!

Note that while the input cards will not have leading zeros, leading zeros are acceptable when the cards are flipped. For example, a card with the number 100 can be flipped to look like 001, which has the value 1.

Input

The first line contains two space-separated integers, n ($1 \leq n \leq 10^5$) and s ($2 \leq s \leq 2 \cdot 10^8$), where n is the number of cards and s is the desired sum.

Each of the next n lines contains an integer x ($1 \leq x \leq 10^8$). These are the cards.

Output

Output a single integer, which is 1 if two cards can be chosen such that (in some orientation) they add up to s, and 0 otherwise.

Sample Input 1	Sample Output 1
3 66 15 21 22	0

Sample Input 2	Sample Output 2
3 63 15 21 22	1

Problem B
Basketball One-on-One
Time Limit: 1 Second

From the 2019 ICPC Mid-Central USA Regional Programming Contest

Alice and Barbara played some friendly games of one-on-one basketball after work, and you agreed to help them keep score. The rules of the game were simple:

- Each successful shot by a player earns them either one or two points
- The first player to eleven points wins, with one exception
- If the score is tied 10–10, the previous rule is replaced by a "win by 2" rule: the first player to lead the other by at least two points wins.

So for example, 11–7, 9–11, and 14–12 are possible final scores (but not 14–13).

Whenever Alice or Barbara scored points, you jotted down an `A` or `B` (indicating a score by Alice or by Barbara) followed by a `1` or `2` (the number of points scored). You have some records of the games Alice and Barbara played in this format, but do not remember who won each game. Can you reconstruct the winner from the game record?

Input

The single line of input contains a string s ($2 \leq |s| \leq 200$), which is the record of one game. The record consists of single letters (either upper-case `A` or upper-case `B`) alternating with single numbers (either `1` or `2`), letters first, and includes no spaces or other extraneous characters. Each record will be a correct scoring history of a single completed game, played under the rules described above.

Output

Output a single character, either `A` or `B`, which is the winner of the recorded game.

Sample Input 1	Sample Output 1
A2B1A2B2A1A2A2A2	A

Sample Input 2	Sample Output 2
A2B2A1B2A2B1A2B2A1B2A1A1B1A1A2	A

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Problem C
From A to B
Time Limit: 1 Second

From the 2019 ICPC Southeast USA Regional Programming Contest

You are given two integers, a and b. You want to transform a to b by performing a sequence of operations. You can only perform the following operations:

- Divide a by two (only if a is even)
- Add one to a

What is the minimum number of these operations you need to transform a into b?

Input

The single line of input contains two space-separated integers a and b ($1 \leq a, b \leq 10^9$). You want to transform a into b using only the operations given above.

Output

Output a single integer, which is the minimum number of the given operations needed to transform a into b.

Sample Input 1	Sample Output 1
103 27	4

Sample Input 2	Sample Output 2
3 8	5

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Problem D
FYI
Time Limit: 1 Second

From the 2019 ICPC Greater New York Regional Programming Contest

In the United States of America, telephone numbers within an area code consist of seven digits: the prefix number is the first three digits and the line number is the last four digits. Traditionally, the 555 prefix number has been used to provide directory information and assistance as in the following examples:

555-1212
555-9876
555-5000
555-7777

Telephone company switching hardware would detect the 555 prefix and route the call to a directory information operator. Nowadays, telephone switching is done digitally and somewhere along the line a computer decides where to route calls.

For this problem, write a program that determines if a supplied seven-digit telephone number should be routed to the directory information operator, that is, the prefix number is 555.

Input

The single line of input contains a single integer n ($1000000 \leq n \leq 9999999$), which is a telephone number.

Output

Output a single integer, which is 1 if the number should be routed to the directory information operator, or 0 if the number should not be routed to the directory information operator.

Sample Input 1	Sample Output 1
5551212	1

Sample Input 2	Sample Output 2
5519876	0

Sample Input 3	Sample Output 3
5055555	0

Sample Input 4	Sample Output 4
5550000	1

Problem E
Kafkaesque
Time Limit: 1 Second

From the 2019 ICPC Mid-Atlantic USA Regional Programming Contest

Getting a business permit in Kafkatown requires a trip to City Hall. There you are given a permit form that must be signed by k city clerks whose names are printed at the bottom of the form.

Entering the clerks' room, you find a long line of people working their way down a narrow aisle along the clerks' desks. Their desks are arranged in increasing numeric order. The aisle is so narrow that the line is forced to shuffle forward, single file, past each of the clerks' desks in turn. Once in the line you cannot leave, back up, or change positions with other people.

As you present your permit for a signature, you are told that no clerk will sign unless all of the signatures above his or her name on the permit form have already been filled in. To your dismay, the clerks' desks are not arranged in the same order as the names on your form.

How many times do you need to pass through the line until you can get your permit?

Input

The first line of input contains an integer k ($1 \leq k \leq 100$), which is the number of signatures you need to collect.

Each of the next k lines contains an integer d ($1 \leq d \leq 100$), which are the desk numbers of each of the clerks whose signature you need, in the order that they appear on your form. No desk number will appear more than once. Clerks whose signatures are not needed on your form are omitted from this list.

For example, the input

```
5
1
23
18
13
99
```

means that you need 5 signatures. The first must come from the clerk in desk #1, the next from the clerk in desk #23, and so on, with the final signature coming from the clerk in desk #99.

Output

Output a single integer, which is the number of passes you need to make through the line until you can collect the signatures that you need.

Sample Input 1	Sample Output 1
5 1 23 18 13 99	3

Sample Input 2	Sample Output 2
5 11 20 33 40 55	1

Sample Input 3	Sample Output 3
8 8 7 6 5 4 3 2 1	8

Problem F
ReMorse
Time Limit: 1 Second

From the 2019 ICPC Southern California Regional Programming Contest

Morse Code is an assignment of sequences of dots and dashes to alphabet characters. You are to create a Morse-like code that yields the shortest total length to a given message, and return that total length.

A dot symbol has length 1. A dash symbol has length 3. The gap between symbols within a character encoding has length 1. The gap between character encodings has length 3. Spaces, punctuation, and alphabetic case are ignored, so the text:

`The quick brown dog jumps over the lazy fox.`

is encoded as though it were just

`THEQUICKBROWNDOGJUMPSOVERTHELAZYFOX`

For example, with input **`ICPC`**, the answer is 17: Encode the **`C`**'s with a single dot, the **`I`** with a dash, and the **`P`** with two dots, for an encoding of

— • •• •

which has length

$$(3) + 3 + (1) + 3 + (1 + 1 + 1) + 3 + (1) = 17.$$

I	(gap)	C	(gap)	P			(gap)	C
—		•		•		•		•
3	3	1	3	1	1	1	3	1

Input

The single line of input contains a string s ($1 \leq |s| \leq 32{,}000$) of upper-case or lower-case letters, spaces, commas, periods, exclamation points, and/or question marks. Everything but the letters should be ignored. The line will contain at least one letter.

Output

Output a single integer, which is the length of s when encoded with an optimal reassignment of the sequences of Morse Code.

Sample Input 1	Sample Output 1
ICPC	17

Sample Input 2	Sample Output 2
A	1

Sample Input 3	Sample Output 3
The quick brown dog jumps over the lazy fox.	335

Problem G
Musical Chairs
Time Limit: 1 Second

From the 2019 ICPC East Central North America Regional Programming Contest

Professor O'Dagio of the music department at Faber College has come up with a rather interesting way of selecting its department chair. All n members of the music faculty line up, then the first one in line calls out an integer k corresponding to the opus number of his or her favorite musical composition by Faber College's most illustrious alumnus, composer I. M. Tondeff. The department members then "count off," starting with the first in line and cycling back to the beginning of the line if necessary. When the count reaches k, that person steps out of the line and is relieved (in more than one sense!) of chairmanship duty for that year.

The next person in line then calls out his or her favorite opus number (this becomes the new value of k) and the count restarts at "1," and continues until the next person is eliminated, and so on. When only one faculty member is left standing, this is the new department chair. To prevent cheating, everyone's favorite number is announced in advance and no one is allowed to choose Tondeff's Opus 1 (the famous drinking song *Rhapsody in Brew*).

For instance, suppose the professors are numbered 1 through 4 and lined up in that order; suppose their favorite opus numbers are, respectively, opus 8 (*The Four Sneezings*), opus 2 (*Concerto for Kazoo and Cigar Box Banjo*), opus 4 (*The Taekwondo Rondo*), and opus 2 (again). The following figure shows the process by which the new chair is selected.

(1)	(2)	(3)	(4)	
8	2	4	2	Professor (1) calls out "8" and begins counting
(1)	(2)	(3)		
8	2	4		Professor (4) is eliminated. Professor (1) (the next in line) calls out "8" and begins counting
(1)		(3)		
8		4		Professor (2) is eliminated. Professor (3) (the next in line) calls out "4" and begins counting
		(3)		
		4		Professor (1) is eliminated. Professor (3) is the new department chair

Input

The first line of input contains an integer n ($2 \leq n \leq 10^4$), which is the number of faculty members.

Each of the next n lines contains an integer k ($2 \leq k \leq 10^6$), which are the numbers of the favorite opuses of the professors in order.

Output

Output a single integer, which is the number of the new department chair.

Sample Input 1	Sample Output 1
4 8 2 4 2	3

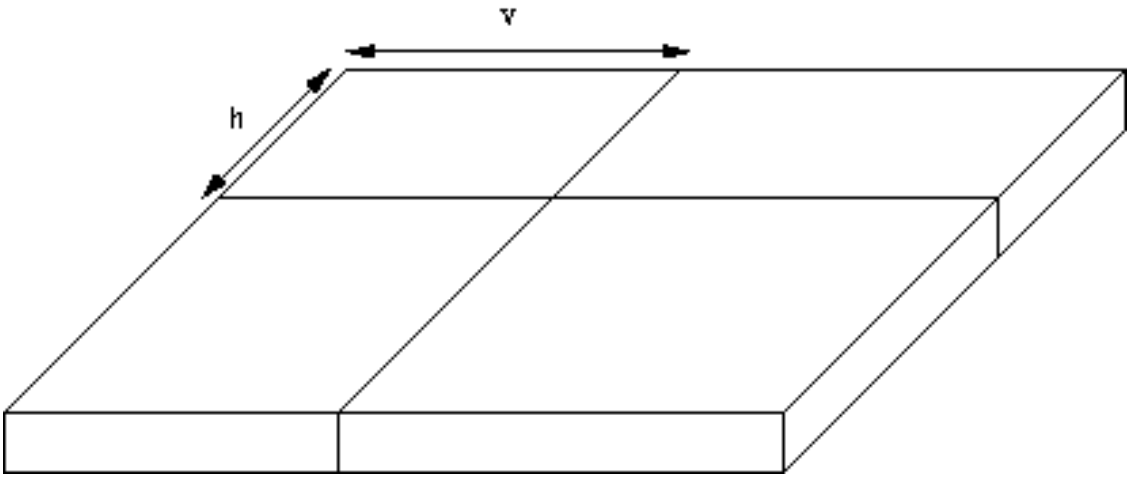
Problem H
Piece of Cake!
Time Limit: 1 Second

From the 2019 ICPC Rocky Mountain Regional Programming Contest

It is Greg's birthday! To celebrate, his friend Sam invites Greg and two other friends for a small party. Of course, every birthday party must have cake.

Sam ordered a square cake. She makes a single horizontal cut and a single vertical cut. In her excitement to eat cake, Sam forgot to make these cuts through the middle of the cake.

Of course, the biggest piece of cake should go to Greg since it is his birthday. Help Sam determine the volume of the biggest piece of cake that resulted from these two cuts. Each cake is 4 centimeters thick.



Input

The single line of input contains three space-separated integers n ($2 \leq n \leq 10^4$), h ($0 < h < n$), and v ($0 < v < n$), where n is the length of the sides of the square cake in centimeters, h is the distance of the horizontal cut from the top edge of the cake in centimeters, and v is the distance of the vertical cut from the left edge of the cake in centimeters. This is illustrated in the figure above.

Output

Output a single integer, which is the volume (in cubic centimeters) of the largest of the four pieces of cake after the horizontal and vertical cuts are made.

Sample Input 1	Sample Output 1
10 4 7	168

Sample Input 2	Sample Output 2
5 2 2	36

Sample Input 3	Sample Output 3
4 2 1	24

Problem I
Some Sum
Time Limit: 1 Second

From the 2019 ICPC North Central North America Regional Programming Contest

Your friend has secretly picked n consecutive integers between 1 and 100 and wants you to guess if their sum is even or odd.

If the sum must be even, output 2. If the sum must be odd, output 1. If the sum could be even or could be odd, output 0.

Input

The single line of input contains a single integer n ($1 \leq n \leq 10$), which is the number of consecutive integers between 1 and 100 that your friend has picked.

Output

Output a single integer, which is 2 if the sum must be even, 1 if the sum must be odd, and 0 if the sum could be either even or odd.

Sample Input 1	Sample Output 1
1	0

Sample Input 2	Sample Output 2
2	1

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Problem J
Speeding
Time Limit: 1 Second

From the 2019 ICPC Pacific Northwest Regional Programming Contest

You'd like to figure out whether a car was speeding while it was driving down a straight road. Unfortunately, you don't have any radar guns or related instruments for measuring speed directly; all you have are photographs taken of the car at various checkpoints on the road at various times. Given when and where these photographs were taken, what is the fastest speed that you can prove the car must have been going at some point along the road?

Input

The first line of input contains an integer n ($2 \leq n \leq 100$), which is the number of photographs taken.

Each of the following n lines contains two space-separated integers t ($0 \leq t \leq 10^4$) and d ($0 \leq d \leq 10^6$), where t is the time of the photograph in hours, and d is the distance along the road in miles. The first photograph is always taken at time 0 with distance 0, and both the times and distances strictly increase.

Output

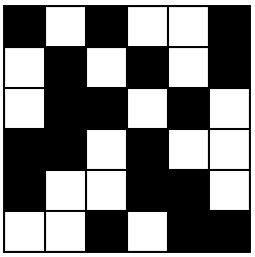
Output a single integer, which is the greatest integral speed that you can be certain the car was going at some point in miles per hour.

Sample Input 1	Sample Output 1
2 0 0 7 42	6

Sample Input 2	Sample Output 2
5 0 0 5 24 10 98 15 222 20 396	34

Problem K
This Ain't Your Grandpa's Checkerboard
Time Limit: 1 Second

From the 2019 ICPC South Central USA Regional Programming Contest



You are given an $n \times n$ grid where each square is colored either black or white. A grid is *correct* if all of the following conditions are satisfied:

- Every row has the same number of black squares as it has white squares.
- Every column has the same number of black squares as it has white squares.
- No row or column has three or more consecutive squares of the same color.

Given a grid, determine whether it is *correct*.

Input

The first line of input contains an integer n ($2 \leq n \leq 24$; n is even), which is the number of squares in a row or column of the checkerboard.

Each of the next n lines contains a string s ($|s| = n$) consisting solely of the upper-case letters '`B`' and/or '`W`', representing the colors of the grid squares.

Output

Output a single integer, which is 1 if the grid is *correct*, and 0 otherwise.

Sample Input 1	Sample Output 1
4 WBBW WBWB BWWB BWBW	1

Sample Input 2	Sample Output 2
4 BWWB BWBB WBBW WBWW	0

Sample Input 3	Sample Output 3
6 BWBWWB WBWBWB WBBWBW BBWBWW BWWBBW WWBWBB	0

Sample Input 4	Sample Output 4
6 WWBBWB BBWWBW WBWBWB BWBWBW BWBBWW WBWWBB	1