



## Xylophone

Xylophone is a musical instrument which is played by striking wooden bars. A single wooden bar will always sound the same pitch, so a xylophone consists of bars with various pitches.

JOI-kun bought a xylophone consisting of  $N$  wooden bars. The bars are lined up in a row and numbered 1 through  $N$  from left to right. The bar with number  $i$  ( $1 \leq i \leq N$ ) sounds a pitch of height  $A_i$  ( $1 \leq A_i \leq N$ ). Different bars sound different pitches. He knows that the bar with the lowest pitch has a smaller number than the bar with the highest pitch.

Because JOI-kun does not know which bar sounds which pitch, he is going to study the pitch of the bars.

JOI-kun has a peculiar sense of sound; when he hears multiple sounds simultaneously, he can tell the difference between the heights of the highest pitch and the lowest pitch. He can strike a lump of bars at a time and hear their sounds. That is, for integers  $s$  and  $t$  ( $1 \leq s \leq t \leq N$ ), he can strike the bars with numbers  $s$  through  $t$  simultaneously, to know the difference between the maximum and the minimum among  $A_s, A_{s+1}, \dots, A_t$ .

He wants determine the pitches of the bars within 10 000 tries of striking.

### Subtasks

All subtasks satisfy the following constraints:

- $1 \leq A_i \leq N$  ( $1 \leq i \leq N$ )
- $A_i \neq A_j$  ( $1 \leq i < j \leq N$ )
- For  $i$  and  $j$  with  $A_i = 1$  and  $A_j = N$ , it holds that  $i < j$ .

There are 3 subtasks. The score and the constraints for each subtask are as follows:

Subtask	Score	$N$
1	11	$2 \leq N \leq 100$
2	36	$2 \leq N \leq 1\,000$
3	53	$2 \leq N \leq 5\,000$



## Implementation details

You should implement the following function `solve` to find the pitches of the bars.

- `solve(N)`
  - $N$ : the number of bars.
  - This function is called exactly once for a test case.

Your program can call the following function prepared by the grader.

★ `query(s, t)`

This function returns the difference between the maximum and the minimum among the sounds of bars in the specified interval.

- \*  $s, t$ :  $s$  is the first number and  $t$  is the last number in the interval of bars to strike. That is, you strike all the bars with number at least  $s$  and at most  $t$ .
- \* It must hold that  $1 \leq s \leq t \leq N$ .
- \* You cannot call `query` more than 10 000 times.
- \* If some of the above conditions are not satisfied, your program will be judged **Wrong Answer**.

★ `answer(i, a)`

Your program should answer the pitches of the bars using this function.

- \*  $i, a$ : these mean that you answer  $A_i$  is  $a$ , where  $A_i$  is the height of the pitch of bar  $i$ .
- \* It must hold that  $1 \leq i \leq N$ .
- \* You cannot call this function for the same value of  $i$  more than once.
- \* You must call this function exactly  $N$  times before the function `solve` terminates.
- \* If some of the above conditions are not satisfied, your program will be judged **Wrong Answer**.
- \* If some of the pitches you answered are different from the actual ones, your program will be judged **Wrong Answer**.



## Sample communication

An example of communication for  $N = 5$ ,  $(A_1, A_2, A_3, A_4, A_5) = (2, 1, 5, 3, 4)$  is shown below.

Call	Return
query(1, 5)	
	4
answer(1, 2)	
query(3, 5)	
	2
answer(2, 1)	
answer(3, 5)	
answer(5, 4)	
answer(4, 3)	

## Sample grader

The sample grader reads the input in the following format:

- line 1:  $N$
- line  $1 + i$  ( $1 \leq i \leq N$ ):  $A_i$

If your program answer the pitches correctly when solve terminates, the sample grader prints Accepted :  $Q$  with  $Q$  being the number of calls to query.

If your program is judged Wrong Answer, it prints Wrong Answer.