

DMOPC '21 Contest 3 P1 - Sums & Differences

Time limit: 2.0s **Memory limit:** 256M

Alice is playing a game with Bob. She hides an array A of N integers from Bob, and asks him to guess the numbers in it. In a single question, if Bob gives Alice a pair of indices (i, j) with $i \neq j$, Alice does the following actions in order:

1. Define $x := A_i$ and $y := A_j$.
2. Set $A_i := x + y$ and $A_j := x - y$.
3. Tell Bob the new value of A_j .

Alice allows at most N questions from Bob. Can you help him figure out the original array (that is, the array A before Alice performs any operations on it)?

Constraints

$$2 \leq N \leq 10^4$$

All elements of A are initially integers in the range $[-10^9, 10^9]$.

Subtask 1 [20%]

$$N = 2$$

Subtask 2 [20%]

$$N = 3$$

Subtask 3 [60%]

No additional constraints.

Interaction

This is an interactive problem, where you and the judge exchange information back-and-forth to solve the problem.

At first, you should read in a line containing the integer N .

You will then start the interaction by proceeding with your questions. Each question should be formatted as `? i j` followed by a `\n` character, with $1 \leq i, j \leq N$ and $i \neq j$. In response, Alice will perform the three actions described in the statement, giving Bob the value of A_j as an integer on its own line.

If you believe you have the solution, you may output `!` followed by a space-separated list of N integers $A_1, A_2, \dots, A_N$, the original elements of A . You must terminate your program immediately after performing this operation. Note that this operation does **not** count towards the limit of N questions.

Also, Alice does not like very large numbers, so all elements of the array must stay in the range $[-10^{18}, 10^{18}]$.

If at any point you attempt an invalid question (such as an invalid output format or a prohibited pair of indices), an element of the array goes out of the range $[-10^{18}, 10^{18}]$, or you exceed the limit of N questions, Alice will respond with $10^{18} + 1$. You should terminate your program immediately after receiving this feedback to receive a `Wrong Answer` verdict, or you may receive an arbitrary verdict. If the final list you output is incorrect, you will receive a `Wrong Answer` verdict. Otherwise, you will receive a verdict of `Accepted` for the corresponding test case.

Please note that you may need to flush `stdout` after each operation, or interaction may halt. In C++, this can be done with `fflush(stdout)` or `cout << flush` (depending on whether you use `printf` or `cout`). In Java, this can be done with `System.out.flush()`. In Python, you can use `sys.stdout.flush()`.

Sample Interaction

`>>>` denotes your output. Do not print this out.

In this case, A is originally $[2, 5, 4]$.

```
3
>>> ? 2 1
3
>>> ? 1 3
-1
>>> ? 2 3
8
>>> ! 2 5 4
```

Explanation

After the first question, A becomes $[3, 7, 4]$. Alice responds with the new value of A_j , which is 3.

After the second question, A becomes $[7, 7, -1]$. Alice responds with the new value of A_j , which is -1 .

After the third question, A becomes $[7, 6, 8]$. Alice responds with the new value of A_j , which is 8.

This interaction would receive an `Accepted` verdict, since it correctly guessed the original list of numbers after asking no more than N questions. Note that the interaction may not represent an optimal or correct strategy to solve the problem, and is only presented for clarity purposes.