Problem I. Interactive Array Modifications

Time limit:	5 seconds
Memory limit:	1024 mebibytes

This is an interactive problem.

The jury has secretly written the array a that contains n integers from 0 to 10^9. It is guaranteed that the minimum value across all elements of a equals 0.

You can make several queries to guess the array. In each query, you should specify an array b that contains n integers from 0 to 10^9. As the response to the query, you receive the new order of elements that should be applied to the array $a + b$ (here $+$ means pointwise sum of arrays a and b) so that it will become stably sorted. In other words, for each query, we can define a new array c of pairs of integers, where $c_i = (a_i + b_i, i)$. The array c is sorted, and you receive the second elements of its pairs in the same order as they appear in the sorted array c.

Your task is to guess the array a using at most 31 queries.

Interaction Protocol

The interaction starts with the jury program writing a single integer t ($1 \le t \le 100$) — the number of scenarios.

The first line of each scenario contains one integer n ($2 \le n \le 10^5$) — the length of the array.

After you read this line, the interaction begins. To ask a query, you should specify an array b of n integers where $0 \le b_i \le 10^9$ and print the line of the following format: "? b_1 b_2 b_3 $\ldots$ b_n".

As the response, you receive the permutation of integers from 1 to n — the order of elements that should be applied to array a'_i, where $a'_i = a_i + b_i$ for all $1 \le i \le n$, so that a'_i will become stably sorted.

You can ask at most 31 queries of this form for each scenario.

After that, you should print the guessed array a in the following form: "! a_1 a_2 a_3 $\ldots$ a_n". This line is not considered a query and is not taken into account when counting the number of queries asked.

After this, proceed to the next scenario, or exit if this is the last scenario.

The interactor in this task is not adaptive. In other words, the array a does not change during the interaction.

It is guaranteed that the sum of n among all test cases does not exceed 10^5.

Remember to print the newline and flush the output buffer after each query and after the answer, or your solution will get IL (Idleness Limit Exceeded).

Example

standard input	standard output
2 2 2 1 1 2 2 1 3 1 2 3 2 3 1 1 3 2	 ? 1 0 ? 0 1 ? 1 1 ! 1 0 ? 0 3 1 ? 1 3 1 ? 0 4 1 ! 3 0 2