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# E. Balanced

time limit per test: 2 seconds memory limit per test: 256 megabytes

You are given a **cyclic** array a with n elements, where n is **odd**. In each operation, you can do the following:

• Choose an index  $1 \le i \le n$  and increase  $a_{i-1}$  by 1,  $a_i$  by 2, and  $a_{i+1}$  by 1. The element before the first element is the last element because this is a cyclic array.

A cyclic array is called balanced if all its elements are equal to each other.

Find any sequence of operations to make this cyclic array balanced or determine that it is impossible. Please note that you **do not** have to minimize the number of operations.

### Input

Each test consists of multiple test cases. The first line contains a single integer t (  $1 \le t \le 2 \cdot 10^5$ ) — the number of test cases. The description of the test cases follows.

The first line of each test case contains a single integer n ( $1 \le n < 2 \cdot 10^5$ , n is **odd**) — the length of the array a.

The second line of each test case contains n integers  $a_1, a_2, \ldots, a_n$  ( $1 \le a_i \le 10^6$ ) — the elements of the array a.

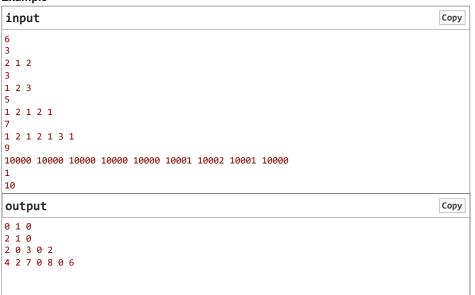
It is guaranteed that the sum of n over all test cases does not exceed  $2 \cdot 10^5$ .

# Output

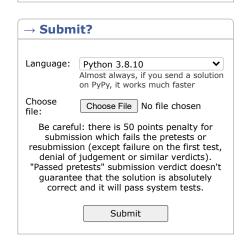
For each test case:

- If it is impossible to make the cyclic array balanced, output -1.
- Otherwise, output n integers  $v_1, v_2, \ldots, v_n$  ( $0 \le v_i \le 10^{18}$ ) where  $v_i$  denotes the number of operations applied to index i. It can be proved that if any solution exists, then there exists a solution under the given constraints. If there are several solutions under the given constraints, output any of them.

# Example



# Contest is running 00:04:53 Contestant



| → Last submissions |                      |                           |  |
|--------------------|----------------------|---------------------------|--|
| Submission         | Time                 | Verdict                   |  |
| 289275569          | Nov/01/2024<br>19:18 | Wrong answer on pretest 1 |  |

| → Score table  |       |  |
|--|-------|--|
|  | Score |  |
| <u>Problem A</u>                                       | 274   |  |
| <u>Problem B</u>                                       | 411   |  |
| <u>Problem C</u>                                       | 685   |  |
| <u>Problem D</u>                                       | 959   |  |
| <u>Problem E</u>                                       | 1233  |  |
| <u>Problem F</u>                                       | 1644  |  |
| Successful hack  | 100   |  |
| Unsuccessful hack                                      | -50   |  |
| Unsuccessful submission                                | -50   |  |
| Resubmission   | -50   |  |
| * If you solve problem on 01:53 from the first attempt |       |  |

<sup>\*</sup> If you solve problem on 01:53 from the first attempt

```
1 1 1 1 1 1 0 1 1
0
```

# Note

In the first test case:

• After 1 operation applied to index i=2, the array a=[3,3,3].

In the second test case:

- After 2 operations applied to index i=1, the array a=[5,4,5] .
- After 1 operation applied to index i=2, the array a=[6,6,6].

In the third test case:

- After 2 operations applied to index i=1, the array a=[5,4,1,2,3].
- After 3 operations applied to index i=3, the array a=[5,7,7,5,3].
- After 2 operations applied to index i=5, the array  $a=\lceil 7,7,7,7,7 \rceil$ .

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