**pinely**

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## C. Absolute Zero

time limit per test: 2 seconds

memory limit per test: 256 megabytes

You are given an array $a$ of $n$ integers.

In one operation, you will perform the following two-step move:

1. Choose an integer $x$ ($0 \le x \le 10^9$).
2. Replace each $a_i$ with $|a_i - x|$, where $|v|$ denotes the absolute value of $v$.

For example, by choosing $x = 8$, the array $[5, 7, 10]$ will be changed into $[|5 - 8|, |7 - 8|, |10 - 8|] = [3, 1, 2]$.

Construct a sequence of operations to make all elements of $a$ equal to $0$ in at most $40$ operations or determine that it is impossible. You do **not** need to minimize the number of operations.

### Input

Each test contains multiple test cases. The first line contains a single integer $t$ ($1 \le t \le 10^4$) — the number of test cases. The description of test cases follows.

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

The second line of each test case contains $n$ integers $a_1, a_2, \ldots, a_n$ ($0 \le a_i \le 10^9$) — 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, output a single integer $-1$ if it is impossible to make all array elements equal to $0$ in at most $40$ operations.

Otherwise, output two lines. The first line of output should contain a single integer $k$ ($0 \le k \le 40$) — the number of operations. The second line of output should contain $k$ integers $x_1, x_2, \ldots, x_k$ ($0 \le x_i \le 10^9$) — the sequence of operations, denoting that on the $i$-th operation, you chose $x = x_i$.

If there are multiple solutions, output any of them.

You do **not** need to minimize the number of operations.

### Example

```
input                                                    Copy

5
1
5
2
0 0
3
4 6 8
4
80 40 20 10
5
1 2 3 4 5
```

```
output                                                   Copy

1
5
0

3
6 1 1
7
60 40 20 10 30 25 5
-1
```

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Sidebar:

**Pinely Round 4 (Div. 1 + Div. 2)**
**Finished**
Practice
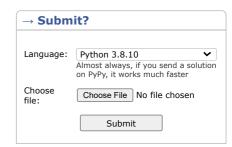⭐

**→ Virtual participation**   ⌄

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

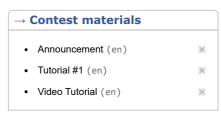[ Start virtual contest ]

**→ Clone Contest to Mashup**   ⌄

You can clone this contest to a mashup.

[ Clone Contest ]

**→ Submit?**

Language:   [ Python 3.8.10        ⌄ ]
Almost always, if you send a solution on PyPy, it works much faster

Choose file:   [ Choose File ] No file chosen

[ Submit ]

**→ Last submissions**

| Submission | Time | Verdict |
|---|---|---|
| 273191296 | Jul/28/2024 19:03 | Accepted |

**→ Problem tags**

constructive algorithms   greedy   math
No tag edit access

**→ Contest materials**

- Announcement (en)   ✕
- Tutorial #1 (en)   ✕
- Video Tutorial (en)   ✕

**Note**

In the first test case, we can perform only one operation by choosing $x = 5$, changing the array from $[5]$ to $[0]$.

In the second test case, no operations are needed because all elements of the array are already $0$.

In the third test case, we can choose $x = 6$ to change the array from $[4, 6, 8]$ to $[2, 0, 2]$, then choose $x = 1$ to change it to $[1, 1, 1]$, and finally choose $x = 1$ again to change the array into $[0, 0, 0]$.

In the fourth test case, we can make all elements $0$ by following the operation sequence $(60, 40, 20, 10, 30, 25, 5)$.

In the fifth test case, it can be shown that it is impossible to make all elements $0$ in at most $40$ operations. Therefore, the output is $-1$.