ZA. Dura

time limit per test: 4.5 seconds
memory limit per test: 1024 megabytes

Dura is a Palestinian city located eleven kilometers southwest of Hebron, in the southern West Bank, in the Hebron Governorate of the State of Palestine. According to the Palestinian Central Bureau of Statistics, the town had a population of 39,336 in 2017. The current mayor is Ahmad Salhoub. Dura is identified with the ancient town of Adoraim, a city of Judah that, according to the Bible, was fortified by Rehoboam. The town is also mentioned in other ancient texts such as the Amarna Letters, the Anastasi Papyrus, and the Zenon Papyri. During the Hellenistic period, the town, then also known as Adora.

Let $a = [a_1, a_2, \ldots, a_n]$ denote an array of size n.

Let's define $f(x, y) = 2(x \mid y) - (x + y)$ where $\mid$ represents the bitwise OR operation.

You are required to process the following types of queries:

1. **Range Sum Query:** Given indices l and r, compute the sum of the array elements in the segment $[l, r]$
2. **Range Update Query:** Given indices l, r, and an integer b, for each $i(l \leq i \leq r)$ assign $a_i := f(a_i, b)$.

Input

The first line contains integer $n(1 \leq n \leq 10^5)$ — the size of the array.

The second line contains n space-separated integers $a_1, a_2, \ldots, a_n(0 \leq a_i \leq 10^9)$ — the original array.

The third line contains an integer $q(1 \leq q \leq 10^5)$ — the number of queries, followed by q lines.

The beginning of each of the next q lines contains an integer $type(1 \leq type \leq 2)$

- If $type = 1$, two intergers $l, r(1 \leq l \leq r \leq n)$ will follow separated by whitespaces.
- If $type = 2$, three integers $l, r, b(1 \leq l \leq r \leq n, 0 \leq b \leq 10^9)$ will follow separated by whitespaces.

Output

For each query of type 1 (**Range Sum Query**) print in a single line the sum of numbers within the given segment. Print the answers to the queries in the order in which the queries go in the input.

Examples

input Copy

```
5
4 10 3 13 7
8
1 2 4
2 1 3 3
1 2 4
1 3 3
2 2 5 5
1 1 5
2 1 2 10
1 2 3
```

output Copy

```
26
22
0
34
11
```

input Copy

```
10
26 6 27 28 28 19 14 8 0 24
3
2 7 8 16
1 4 7
2 6 9 10
```

output Copy

```
105
```

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data-structure (medium)

Finished

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