Yet another queries

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1.5 seconds
Memory limit:	256 megabytes

You are given an array $a_0,\ a_1,\ \ldots,\ a_{2^n-1}$ consisting of 2^n elements. Note that the elements are numbered from zero.

You have to process q queries to this array of two types:

- $1\ l\ r\ k\ v$. In this case, the elements $a_{l\oplus k}$, $a_{(l+1)\oplus k}$, ..., $a_{r\oplus k}$ are replaced with v.
- $2\ l\ r\ k$. In this case you need to calculate the sum $a_{l\oplus k} + a_{(l+1)\oplus k} + \cdots + a_{r\oplus k}$.

Here «$\oplus$» denotes the bitwise XOR operation.

Input

The first line contains a single integer n ($0 \le n \le 20$).

The second line contains 2^n integers $a_0,\ a_1,\ \ldots,\ a_{2^n-1}$ ($0 \le a_i \le 10^7$) – the elements of the array.

The third line contains a single integer q ($1 \le q \le 10^6$) – the number of queries.

The next q lines contain the query descriptions. The i-th line contains an integer t_i ($1 \le t_i \le 2$).

- If $t_i = 1$, then the line contains four integers l_i, r_i, k_i, and v_i ($0 \le l_i \le r_i < 2^n$, $0 \le k_i < 2^n$, $0 \le v_i \le 10^9$). In this case, we need to assign the value v_i to each of the elements $a_{l_i\oplus k_i}$, $a_{(l_i+1)\oplus k_i}$, ..., $a_{r_i\oplus k_i}$.
- If $t_i = 2$, then the line contains three integers l_i, r_i, and k_i ($0 \le l_i \le r_i < 2^n$, $0 \le k_i < 2^n$). In this case, we need to calculate the sum $a_{l_i\oplus k_i} + a_{(l_i+1)\oplus k_i} + \ldots + a_{r_i\oplus k_i}$.

Output

For each query of the second type, print the desired sum.

Example

standard input	standard output
3 1 5 8 4 3 7 8 4 3 2 4 7 1 1 1 5 3 8 2 4 7 1	22 26

Note

In the first query, $a_{4\oplus1} + a_{5\oplus1} + a_{6\oplus1} + a_{7\oplus1} = a_5 + a_4 + a_7 + a_6 = 22$.

In the second query, we need to replace elements $a_{1\oplus3}, a_{2\oplus3}, a_{3\oplus3}, a_{4\oplus3}$ and $a_{5\oplus3}$ with 8. The array after these changes will be $8, 8, 8, 4, 3, 7, 8, 8$.

In the last query, $a_{4\oplus1} + a_{5\oplus1} + a_{6\oplus1} + a_{7\oplus1} = 26$.

Scoring

The tests for this problem consist of 8 groups. Points for each group are awarded only if all the tests in that group and some tests from the previous groups pass. **Offline-testing** means that the results of testing your solution on this group will only be available after the competition ends.

Group	Score	Additional constaints				Required groups	Comment
		n	q	a_i	v_i		
0	0	–	–	–	–	–	Samples.
1	19	$n \leq 10$	$q \leq 1000$	–	–	0	
2	17	$n \leq 17$	$q \leq 200\,000$	–	–	–	k_i is a power of two. If $t_i = 1$, then $l_i = r_i$
3	11	–	–	$a_i \leq 1$	–	–	$t_i = 2$
4	13	–	–	$a_i \leq 1$	$v_i \leq 1$	3	
5	12	$n \leq 17$	$q \leq 200\,000$	–	–	–	$t_i = 2$
6	9	$n \leq 17$	$q \leq 200\,000$	–	–	2	If $t_i = 1$, then $l_i = r_i$
7	10	$n \leq 17$	$q \leq 200\,000$	–	–	0, 1, 2, 5, 6	
8	9	–	–	–	–	0 – 7	**Offline-testing.**