

Problem B. New Divide

Input file: *standard input*
Output file: *standard output*
Time limit: 2 seconds
Memory limit: 512 mebibytes

Consider an array of k integers b_1, b_2, \dots, b_k . Let $x \oplus y$ be the bitwise exclusive OR of x and y . We shall say the *linear power* of the array b is

$$LP(b) = \max_{i=0,1,\dots,k} (b_1 \oplus \dots \oplus b_i) + (b_{i+1} \oplus \dots \oplus b_k).$$

You are given an array a of n integers. Find the linear power of all its prefixes.

Input

The first line contains a positive integer n ($1 \leq n \leq 10^6$), the length of the array.

The second line contains n integers a_i ($0 \leq a_i \leq 10^6$).

Output

Output a single line containing n space-separated integers: $LP(a_1), LP(a_1, a_2), \dots, LP(a_1, a_2, \dots, a_n)$.

Examples

standard input	standard output
5 1 2 3 4 5	1 3 6 10 9
10 11 13 14 14 9 8 0 10 10 7	11 24 20 24 15 23 23 17 23 30