Task AT11. **Fast and Furious Transport**

Two gangs of racers (each gang consisting of n people) drive along two adjacent roads.

Some racers are furious. More formally, each gang is described by a sequence of n zeros and ones, with a one in the i-th position of the sequence if and only if the i-th racer is furious. Racers are numbered from 0 to $n-1$. The first gang is described by the sequence a_i, $0 \leq i < n$, the second by the sequence b_j, $0 \leq j < n$.

It should be noted that the second gang is somewhat more orderly furious than the first. Namely, there are k leaders in the second gang, and all the furious racers of the second gang form k continuous segments in the sequence, each starting with a leader.

Two gangs want to unite and drive along the highway together, forming one sequence from two. It is known that the furiousness of the racers will somehow change depending on the current furiousness of the two gangs. Namely, the racer in the i-th place of a new sequence of $2n$ racers will be furious if

$a_0*b_i + a_1*b_{i-1} + ... + a_i*b_0 = 1$ (mod 2),

where a, b are sequences describing the two gangs (we assume that a_i, $b_i = 0$ for $i \geq n$). Note that it does not matter which racer will be in the i-th place, i.e. furiousness is a property of a place.

Help the racers (writing program **fft**) get the description of furious places in the new sequence!

Input. The first line of the input file contains a number n ($1 \leq n \leq 300\,000$) − the number of racers in each gang. The second line of the input file contains a sequence of n zeros and ones a_i, describing the furiousness of the first gang. The third line contains a sequence of n zeros and ones b_i, describing the furiousness of the second gang. It is guaranteed that if k is the number of continuous segments of ones in the sequence b_i, then $nk \leq 3\,000\,000$.

Output a sequence of $2n$ zeros and ones − a description of the furiousness of the new gang obtained by combining the old ones.

Examples

Input	Input
2 0 1 1 0	4 0 1 0 1 1 1 1 1
Output	**Output**
0 1 0 0	0 1 1 0 0 1 1 0