Circular Convolution

Input file:	`standard input`
Output file:	`standard output`
Time limit:	8 seconds
Memory limit:	1024 megabytes

Given an integer n and two integer sequences $a_0, a_1, \ldots, a_{n-1}$ and $b_0, b_1, \ldots, b_{n-1}$, you need to calculate an integer sequence $c_0, c_1, \ldots, c_{n-1}$ as follows:

$$c_k = \sum_{i+j \equiv k \pmod{n}} a_i b_j$$

Input

The first line contains an integer n ($1 \le n \le 10^6$).

The second line contains n integers $a_0, a_1, \ldots, a_{n-1}$ ($-10^6 \le a_i \le 10^6$).

The third line contains n integers $b_0, b_1, \ldots, b_{n-1}$ ($-10^6 \le b_i \le 10^6$).

Output

Output n integers $c_0, c_1, \ldots, c_{n-1}$ in one line.

Example

standard input	standard output
3 1 1 4 5 1 4	13 22 25

Note

For the sample case:

$$c_0 = a_0b_0 + a_1b_2 + a_2b_1 = 1 \times 5 + 1 \times 4 + 4 \times 1 = 13$$

$$c_1 = a_0b_1 + a_1b_0 + a_2b_2 = 1 \times 1 + 1 \times 5 + 4 \times 4 = 22$$

$$c_2 = a_0b_2 + a_1b_1 + a_2b_0 = 1 \times 4 + 1 \times 1 + 4 \times 5 = 25$$