

Problem A. Tritwise Mex

Input file: *standard input*
 Output file: *standard output*
 Time limit: 4 seconds
 Memory limit: 256 mebibytes

Let us denote $\text{mex}(a, b)$ (minimum excludant) as the minimum non-negative integer which is neither equal to a nor equal to b . It always holds that $\text{mex}(a, b) < 3$, thus we can define tritwise mex. If we write a and b in ternary notation:

$$a = \sum_{i=0}^{k-1} a_i \cdot 3^i, \quad b = \sum_{i=0}^{k-1} b_i \cdot 3^i,$$

where a_i and b_i are integers from 0 to 2, we define mex_3 as follows:

$$\text{mex}_3(a, b) = \sum_{i=0}^{k-1} \text{mex}(a_i, b_i) \cdot 3^i.$$

You are given two sequences a_0, \dots, a_{3^k-1} and b_0, \dots, b_{3^k-1} . You have to compute the sequence c_0, \dots, c_{3^k-1} :

$$c_k = \sum_{\text{mex}_3(i,j)=k} a_i \cdot b_j.$$

Input

The first line of input contains a single integer k ($1 \leq k \leq 12$).

The second line of input contains 3^k integers a_0, \dots, a_{3^k-1} ($0 \leq a_i \leq 10^3$).

The third line of input contains 3^k integers b_0, \dots, b_{3^k-1} ($0 \leq b_i \leq 10^3$).

Output

Output 3^k integers c_0, \dots, c_{3^k-1} separated by spaces.

Examples

standard input	standard output
1 1 1 1 1 1 1	4 3 2
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16 12 8 12 9 6 8 6 4

Note

For reference: $3^{12} = 531\,441$.