Hadamard Matrix

Time limit: 1 sec

a Hadamard matrix, named after the French mathematician Jacques Hadamard, is a square matrix. There are several Hadamard matrices, each is identified by an integer **n**. The Hadamard matrix of the order n is denoted by H_n and has the size of n row and n column. The Hadamard matrix of rank 2n can be constructed from the Hadamard matrix of rank n. The construction of the Hadamard matrix of rank n can be defined recursively as follow.

$$H_1 = [1]$$

$$H_2 = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

$$H_n = \begin{bmatrix} H_{2^{n-1}} & H_{2^{n-1}} \\ H_{2^{n-1}} & -H_{2^{n-1}} \end{bmatrix}$$

Given a column vector of size n $v = \begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ v_n \end{bmatrix}$, calculate $H_n v$ which is the production of the metrix H_n and a vector v

Input

- The first line of input contains an integers **n. It is guaranteed that n = 2^k where 0 <= k <= 18.**
- The second line contains **n** integers representing $v_1, v_2, \ldots, v_n$ where $-1{,}000 < v_n < 1000$**.**

Output

The output must be exactly 1 lines that contains N integers that described the vector $H_n v$.

Example

Input	Output
1 10	10
2 10 20	30 -10
4 1 2 4 8	15 -5 -9 3