Problem D. Master of Both III

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

Prof.Chen is the master of theoretical computer science and table tennis. Now he is busy playing table tennis, so he left this algorithm problem for you.

You are given an integer n. For each set S, let $f(S)$ be the minimum sum of costs of operations to change all elements in S into 0. The only operation you can perform on S is:

- Select a subset $T \subseteq S$ and an integer y, and assign $S \leftarrow S \setminus T \cup \{(x+y) \bmod n | x \in T\}$. The cost of this operation is w_y.

For example, assume $S = \{0, 1, 1\}$. If we select $T = \{0, 1\}$ and $y = 2$ to perform the operation, $\{(x+y) \bmod n | x \in T\} = \{2, 0\}$. So S becomes $\{2, 0, 1\}$ after the operation.

Calculate $f(S)$ for each non-empty set $S \subseteq \{0, 1, \ldots, n-1\}$ that does not contains duplicate elements. In order to avoid massive amount of output, output:

$$\sum_{\varnothing \neq S \subseteq \{0,1,\ldots,n-1\}} f(S) \cdot \sum_{v \in S} 2^v$$

Since the answer might be large, output it modulo $998\,244\,353$.

Input

The first line contains one integer n ($1 \leq n \leq 22$), denoting the limit of the set described above.

The second line contains n integers, the i-th integer is w_{i-1} ($1 \leq w_{i-1} \leq 10^9$), denoting the cost of the operations.

Output

Output one integer in one line, the answer.

Examples

standard input	standard output
3 2 1 2	45
4 1919810 999999998 999999997 114114514	152175989