Problem G
Exotic Convolution

Time Limit: 1 seconds

Memory Limit: 512 megabytes

You are given a binary three-dimensional array $t[n][3][3]$, where $t[i][a][b] = t[i][b][a]$, and two integers u and v where $0 \le u, v < 3^n$.

In base 3, u and v are represented as:

$$u = a_0 + a_1 \cdot 3^1 + \ldots + a_{n-1} \cdot 3^{n-1}$$

$$v = b_0 + b_1 \cdot 3^1 + \ldots + b_{n-1} \cdot 3^{n-1}$$

where $0 \le a_i, b_i < 3$.

Let define the function f as follows:

$$f(u, v) = t[0][a_0][b_0] + t[1][a_1][b_1] \cdot 2^1 + \ldots + t[n-1][a_{n-1}][b_{n-1}] \cdot 2^{n-1}$$

It is straight-forward to show that $0 \le f(u, v) < 2^n$.

Your task is to calculate the array c, defined as follows:

$$c_i = \sum_{f(u,v)=i} a_u \cdot b_v$$

Input

The first line contains n $(0 \le n \le 11)$.

The next n lines of the input represents the binary array t. The i^{th} line contains 9 integers: $t[i-1][0][0], t[i-1][0][1], t[i-1][0][2], t[i-1][1][0], t[i-1][1][1], t[i-1][1][2], t[i-1][2][0], t[i-1][2][1], t[i-1][2][2]$, separated by spaces.

It is guaranteed that all elements of t are either 0 or 1, and $t[i][x][y] = t[i][y][x]$.

The next line contains 3^n space-separated integers: $a_0, a_1, \ldots, a_{3^n-1}$. It is guaranteed that $0 \le a_i \le 10^9$.

The next line contains 3^n space-separated integers: $b_0, b_1, \ldots, b_{3^n-1}$. It is guaranteed that $0 \le b_i \le 10^9$.

Output

Print 2^n space-separated integers on a single line: $c_0, c_1, \ldots, c_{2^n-1}$ modulo $10^9 + 7$.

Sample Input	Sample Output
1 0 0 0 0 0 0 0 0 1 0 0 6 4 8 4	72 24