Over the Hill, Part 1
Problem ID: overthehill1

Hill encryption (devised by mathematician Lester S. Hill in 1929) is a technique that makes use of matrices and modular arithmetic. It is ideally used with an alphabet that has a prime number of characters, so we'll use the 37 character alphabet `A, B, ..., Z, 0, 1, ..., 9,` and the space character. The steps involved are the following:

1. Replace each character in the initial text (the *plaintext*) with the substitution `A`$\to$ `0, B`$\to$ `1, ..., (space)`$\to$ 36. If the plaintext is `ATTACK AT DAWN` this becomes

$$0\ 19\ 19\ 0\ 2\ 10\ 36\ 0\ 19\ 36\ 3\ 0\ 22\ 13$$

2. Group these number into three-component vectors, padding with spaces at the end if necessary. After this step we have

$$\begin{pmatrix} 0 \\ 19 \\ 19 \end{pmatrix} \begin{pmatrix} 0 \\ 2 \\ 10 \end{pmatrix} \begin{pmatrix} 36 \\ 0 \\ 19 \end{pmatrix} \begin{pmatrix} 36 \\ 3 \\ 0 \end{pmatrix} \begin{pmatrix} 22 \\ 13 \\ 36 \end{pmatrix}$$

3. Multiply each of these vectors by a predetermined 3×3 encryption matrix using modulo 37 arithmetic. If the encryption matrix is

$$\begin{pmatrix} 30 & 1 & 9 \\ 4 & 23 & 7 \\ 5 & 9 & 13 \end{pmatrix}$$

then the first vector is transformed as follows:

$$\begin{aligned} \begin{pmatrix} 30 & 1 & 9 \\ 4 & 23 & 7 \\ 5 & 9 & 13 \end{pmatrix} \begin{pmatrix} 0 \\ 19 \\ 19 \end{pmatrix} &= \begin{pmatrix} (30 \times 0 + 1 \times 19 + 9 \times 19) & \bmod 37 \\ (4 \times 0 + 23 \times 19 + 7 \times 19) & \bmod 37 \\ (5 \times 0 + 9 \times 19 + 13 \times 19) & \bmod 37 \end{pmatrix} \\ &= \begin{pmatrix} 5 \\ 15 \\ 11 \end{pmatrix} \end{aligned}$$

4. After multiplying all the vectors by the encryption matrix, convert the resulting values back to the 37-character alphabet and concatenate the results to obtain the encrypted *ciphertext*. In our example the ciphertext is `FPLSFA4SUK2W9K3`.

This method can be generalized to work with any $n \times n$ encryption matrix in which case the initial plaintext is broken up into vectors of length n. For this problem you will be given an encryption matrix and a plaintext and must compute the corresponding ciphertext.

Input

Input begins with a line containing a positive integer $n \leq 10$ indicating the size of the matrix and the vectors to use in the encryption. After this are n lines each containing n non-negative integers specifying the encryption matrix. After this is a single line containing the plaintext consisting only of characters in the 37-character alphabet specified above.

Output

Output the corresponding ciphertext on a single line.

Sample Input 1	Sample Output 1
3 30 1 9 4 23 7 5 9 13 ATTACK AT DAWN	FPLSFA4SUK2W9K3

Sample Input 2	Sample Output 2
6 26 11 23 14 13 16 6 7 32 4 29 29 26 19 30 10 30 11 6 28 23 5 24 23 6 24 1 27 24 20 13 9 32 18 20 18 MY HOVERCRAFT IS FULL OF EELS	W4QVBO0NJG5 Y76H5A6XHR11BV670Z