

Product Matrix

Input file: **standard input**
 Output file: **standard output**
 Time limit: 3 seconds
 Memory limit: 1024 megabytes

The time limit for this problem might be tight.

You are given an $N \times N$ square matrix $P(x)$, where each element is a polynomials of degree 1 or less. The (i, j) -th element of $P(x)$ is $a_{i,j}x + b_{i,j}$.

Compute each coefficient c_0, c_1, \dots, c_M of the $(1, 1)$ -element $f(x) = \sum_{i=0}^M c_i x^i$ of the product $\prod_{i=0}^{M-1} P(2^i x) = P(x)P(2x) \dots P(2^{M-1}x)$, modulo $(10^9 + 7)$.

Constraints

- $1 \leq N \leq 6$
- $1 \leq M \leq 5 \times 10^5$
- $0 \leq a_{i,j}, b_{i,j} < 10^9 + 7$

Input

The input is given in the following format from standard input:

```
N M
a1,1 a1,2 ... a1,N
a2,1 a2,2 ... a2,N
⋮
aN,1 aN,2 ... aN,N
b1,1 b1,2 ... b1,N
b2,1 b2,2 ... b2,N
⋮
bN,1 bN,2 ... bN,N
```

Output

Output the coefficients c_0, c_1, \dots, c_M modulo $(10^9 + 7)$, each on a separate line in this order.

Examples

standard input	standard output
2 2 1 2 3 4 2 0 1 2	4 8 14
(download in the attachments)	(download in the attachments)
(download in the attachments)	(download in the attachments)

Note

For the first sample case:

Since

$$P(x)P(2x) = \begin{pmatrix} x+2 & 2x \\ 3x+1 & 4x+2 \end{pmatrix} \begin{pmatrix} 2x+2 & 4x \\ 6x+1 & 8x+2 \end{pmatrix} = \begin{pmatrix} 14x^2+8x+4 & 20x^2+12x \\ 30x^2+24x+4 & 44x^2+28x+4 \end{pmatrix},$$

the answer is $f(x) = 14x^2 + 8x + 4$.