Maths

Objective

The objective of this problem is to test the students' understanding on **Recursion**. Students also need to know the basic algorithm for multiplying and adding 2 matrices.

Problem Description

Your task is to compute the result of "$\mathbf{I} + \mathbf{A} + \mathbf{A}^2 + \mathbf{A}^3 + \mathbf{A}^4 + \ldots + \mathbf{A}^{\mathbf{N}}$", given a 2x2 matrix **A** and an integer **N**, I is an identity matrix, $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$. If the element A[i, j] ≥ **M**, you need to subtract **M** from A[i, j] until 0 ≤ A[i, j] < **M**.

Input

The first two lines of the input contain the information of matrix **A**. The next line contains 2 integers **N** (1 ≤ **N** ≤ 1,000,000,000) and **M** (1 ≤ **M** ≤ 1,000,000).

Output

Output the result of "$\mathbf{I} + \mathbf{A} + \mathbf{A}^2 + \mathbf{A}^3 + \mathbf{A}^4 + \ldots + \mathbf{A}^{\mathbf{N}}$".

Sample Input

```
1 2
3 4
2 10
```

Sample Output

```
9 2
8 7
```

Explanation

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} + \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} + \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}^2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} + \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} + \begin{pmatrix} 7 & 10 \\ 15 & 22 \end{pmatrix} = \begin{pmatrix} 9 & 12 \\ 18 & 27 \end{pmatrix}$$

Some elements in the final result are larger than or equal to **M**. Hence we need to subtract **M** from those elements until they are smaller than **M**. The final result is $\begin{pmatrix} 9 & 2 \\ 8 & 7 \end{pmatrix}$.

Note

The main Java class must be called **Maths**, and be in the source file **Maths.java**.