Problem D
Matrix Cypher

Alice and Bob communicate via a matrix channel. Alice wants to send a message to Bob. She has a bitstring representing her message and performs a bitwise encoding algorithm: She starts with the identity matrix

$$A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

and then reads the bitstring starting from the left-most bit. For each 0-bit she multiplies the matrix A from the right with

$$\begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}, \text{ i.e. } A \leftarrow A \cdot \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}.$$

For each 1-bit she multiplies the matrix A from the right with

$$\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}, \text{ i.e. } A \leftarrow A \cdot \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}.$$

Then the result is transmitted.

Now Bob accidentally deleted the software to decrypt a message from Alice. Can you help him to rewrite it?

Input

The input consists of:

- two lines, the i-th of them with two integers a_{i1} and a_{i2} ($0 \leq a_{i1}, a_{i2} \leq 2^{128} - 1$ for all $1 \leq i \leq 2$), where

$$\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$$

  is the matrix containing the encoded message.

The bitstring representing the message consists of at most 120 characters.

Output

Output the decoded bitstring.

Sample Input 1	Sample Output 1
2 1 3 2	010

Sample Input 2	Sample Output 2
18 29 13 21	10010101

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