

## Problem C. Cryptography

Input file: *standard input*  
Output file: *standard output*  
Time limit: 1 second  
Memory limit: 512 mebibytes

Given three arrays  $f, g, h$  of length  $2^m$ , Bobo defines a cryptographic function  $\text{enc}(x, y) = (a, b)$  where

- $a = y \oplus g[x \oplus f[y]]$ ,
- $b = x \oplus f[y] \oplus h[y \oplus g[x \oplus f[y]]]$ .

He also has  $q$  questions  $(a_1, b_1), \dots, (a_q, b_q)$ .

For each  $(a_i, b_i)$ , find a pair of integers  $(x, y)$  where  $0 \leq x, y < 2^m$  and  $\text{enc}(x, y) = (a_i, b_i)$ . It is guaranteed that for each  $(a_i, b_i)$ , there exists a **unique** pair  $(x, y)$  satisfying the condition.

Note:  $\oplus$  denotes the bitwise exclusive-or, i.e., xor.

### Input

The input consists of several test cases terminated by end-of-file. For each test case,

The first line contains two integers  $m$  and  $q$ .

The second line contains  $2^m$  integers  $f[0], \dots, f[2^m - 1]$ .

The third line contains  $2^m$  integers  $g[0], \dots, g[2^m - 1]$ .

The fourth line contains  $2^m$  integers  $h[0], \dots, h[2^m - 1]$ .

For the following  $q$  lines, the  $i$ -th line contains two integers  $a_i$  and  $b_i$ .

- $1 \leq m \leq 16$
- $1 \leq q \leq 10^5$
- $0 \leq f[i], g[i], h[i] < 2^m$  for each  $0 \leq i < 2^m$
- $0 \leq a_i, b_i < 2^m$  for each  $1 \leq i \leq q$
- In each input, the sum of  $2^m$  does not exceed  $10^5$ . The sum of  $q$  does not exceed  $10^5$ .

### Output

For each question, output two integers which denote the found  $x$  and  $y$ .

### Examples

standard input	standard output
2 2	3 0
0 1 2 3	1 2
1 2 3 0	0 0
2 3 0 1	
0 1	
2 3	
1 1	
0 0	
0 0	
0 0	
0 0	