Dreamy Putata

Input file:	`standard input`
Output file:	`standard output`
Time limit:	6 seconds
Memory limit:	1024 mebibytes

Putata is dreaming that he got lost in a phantom grid world of size $n \times m$. The rows and columns of the grid are numbered from 0 to $n-1$ and 0 to $m-1$, respectively. Putata has no idea how to escape from the phantom world, so he decides to walk randomly. Assuming Putata is now at (x, y), he will:

- Move to $(x, (y-1) \bmod m)$ with probability $\frac{\ell(x,y)}{100}$.
- Move to $(x, (y+1) \bmod m)$ with probability $\frac{r(x,y)}{100}$.
- Move to $((x-1) \bmod n, y)$ with probability $\frac{u(x,y)}{100}$.
- Move to $((x+1) \bmod n, y)$ with probability $\frac{d(x,y)}{100}$.

You need to perform q operations. Each operation is one of the following:

- "1 x y $c\ell$ cr cu cd" ($0 \le x < n$, $0 \le y < m$, $1 \le c\ell, cr, cu, cd \le 100$, $c\ell + cr + cu + cd = 100$): Change the values of $\ell(x,y)$, $r(x,y)$, $u(x,y)$, and $d(x,y)$ into $c\ell$, cr, cu, and cd, respectively.
- "2 sx sy tx ty" ($0 \le sx, tx < n$, $0 \le sy, ty < m$, $(sx, sy) \ne (tx, ty)$): Assuming Putata is now at (sx, sy), he is wondering what is the expected number of steps that he will take when he reaches the target position (tx, ty) for the first time.

Please write a program to answer his questions.

Input

The first line of the input contains two integers n and m ($3 \le n \le 10^5$, $3 \le m \le 5$) denoting the size of the phantom grid world.

In the next n lines, the i-th line contains m integers $\ell(i-1, 0), \ell(i-1, 1), \ldots, \ell(i-1, m-1)$ ($1 \le i \le n$, $1 \le \ell(\cdot, \cdot) \le 100$).

In the next n lines, the i-th line contains m integers $r(i-1, 0), r(i-1, 1), \ldots, r(i-1, m-1)$ ($1 \le i \le n$, $1 \le r(\cdot, \cdot) \le 100$).

In the next n lines, the i-th line contains m integers $u(i-1, 0), u(i-1, 1), \ldots, u(i-1, m-1)$ ($1 \le i \le n$, $1 \le u(\cdot, \cdot) \le 100$).

In the next n lines, the i-th line contains m integers $d(i-1, 0), d(i-1, 1), \ldots, d(i-1, m-1)$ ($1 \le i \le n$, $1 \le d(\cdot, \cdot) \le 100$).

It is guaranteed that $\ell(i,j) + r(i,j) + u(i,j) + d(i,j) = 100$ holds for all pairs of (i, j) where $0 \le i < n$ and $0 \le j < m$.

The next line contains a single integer q ($1 \le q \le 3 \cdot 10^4$) denoting the number of operations.

Each of the next q lines describes an operation in the format described in the statement above.

Output

For each test query, print a single line containing an integer: the expected number of steps that Putata will take when he reaches the target position (tx, ty) for the first time.

More precisely, assuming the reduced fraction of the answer is $\frac{p}{q}$, you should output the minimum non-negative integer r such that $q \cdot r \equiv p \pmod{10^9+7}$. You may safely assume that such r always exists in all test cases.

Example

standard input	standard output
4 3 1 2 3 4 5 6 7 8 9 10 11 12 23 24 25 26 27 28 29 30 31 32 33 34 10 11 12 13 14 15 16 17 18 19 20 21 66 63 60 57 54 51 48 45 42 39 36 33 4 2 0 1 1 1 2 0 0 3 2 1 1 1 25 25 25 25 2 0 0 3 2	76426175 344136684 555192113