# Problem E. Cave Escape

| | |
|---|---|
| Input file: | `standard input` |
| Output file: | `standard output` |
| Time limit: | 2 seconds |
| Memory limit: | 256 megabytes |

Bob is stuck in a cave represented by a matrix of $\mathbf{N}$ rows and $\mathbf{M}$ columns, where rows are numbered from $\mathbf{1}$ to $\mathbf{N}$ from top to buttom, and columns are numbered from $\mathbf{1}$ to $\mathbf{M}$ from left to right. The cell at the i-th row and the j-th column is denoted by $(i, j)$.

Bob is currently at the cell $(\mathbf{S_R}, \mathbf{S_C})$, and the exit of the save is located at the cell $(\mathbf{T_R}, \mathbf{T_C})$.

Each cell in this cave contains a number, which is called the magic value. The magic value of cell $(i, j)$ is $\mathbf{V_{ij}}$.

When Bob moves from one cell to an unvisited cell, he gains energy points equals to the product of two magic values. It means, if Bob moves from cell $(i, j)$ to cell $(x, y)$, and cell $(x, y)$ is unvisited, he will gain $\mathbf{V_{ij}} \times \mathbf{V_{xy}}$ energy points.

Bob can move between cells that share an edge (not just a corner). On the exit cell, Bob can choose not to exit the cave and continue to explore the cave if he want to. Can you help him find the maximum number of energy points he can gain when he exits the cave.

## Input

The first line of the input gives the numbers of test cases, $\mathbf{T}$. $\mathbf{T}$ test cases follow. Each test case contains two lines. The first line contains six integers $\mathbf{N}$, $\mathbf{M}$, $\mathbf{S_R}$, $\mathbf{S_C}$, $\mathbf{T_R}$ and $\mathbf{T_C}$ as described above.

The next line contains fix integers in the following format, respectively:

$\mathbf{X_1}$ $\mathbf{X_2}$ $\mathbf{A}$ $\mathbf{B}$ $\mathbf{C}$ $\mathbf{P}$

These values are used to generate $\mathbf{V_{ij}}$ as follows:

We define:

$\mathbf{X_i} = (\mathbf{A} \times \mathbf{X_{i-1}} + \mathbf{B} \times \mathbf{X_{i-2}} + \mathbf{C})$ *module* $\mathbf{P}$, for $i = 3$ to $\mathbf{N} \times \mathbf{M}$.

We also define:

$\mathbf{V_{ij}} = \mathbf{X_{(i-1)*M+j}}$, for $i = 1$ to $\mathbf{N}$, and $j = 1$ to $\mathbf{M}$.

$1 \le \mathbf{T} \le 10$.

$1 \le \mathbf{N}, \mathbf{M} \le 1000$.

$1 \le \mathbf{S_R}, \mathbf{T_R} \le \mathbf{N}$.

$1 \le \mathbf{S_C}, \mathbf{T_C} \le \mathbf{M}$.

$0 \le \mathbf{X_1}, \mathbf{X_2}, \mathbf{A}, \mathbf{B}, \mathbf{C} \le \mathbf{P}$.

$1 \le \mathbf{P} \le 100$.

## Output

For each test case, output one line containing "Case #x: y", where x is the test case number (starting from 1) and y is the maximum energy points that Bob can gain.

## Example

| standard input | standard output |
|---|---|
| 2<br>1 4 1 2 1 3<br>1 2 2 3 1 5<br>6 1 2 1 4 1<br>0 1 2 3 0 4 | Case #1: 17<br>Case #2: 8 |

## Note

In Sample Case #1, The matrix is:

$$\begin{bmatrix} 1 & 2 & 3 & 3 \end{bmatrix}$$

one way to get 17 energy points is:

- $(1, 2) \rightarrow (1, 1)$, get $1 \times 2$ energy points.
- $(1, 1) \rightarrow (1, 2)$, get 0 energy points.
- $(1, 2) \rightarrow (1, 3)$, get $2 \times 3$ energy points.
- $(1, 3) \rightarrow (1, 4)$, get $3 \times 3$ energy points.
- $(1, 4) \rightarrow (1, 3)$, get 0 energy points.

In Sample Case #2, The matrix is:

$$\begin{bmatrix} 0 \\ 1 \\ 2 \\ 3 \\ 0 \\ 1 \end{bmatrix}$$

one way to get 8 energy points is:

- $(2, 1) \rightarrow (3, 1)$, get $1 \times 2$ energy points.
- $(3, 1) \rightarrow (4, 1)$, get $2 \times 3$ energy points.