Cutting Boards



Chinese Version Russian Version

Alice gives Bob a board composed of $m \times n$ wooden squares and asks him to find the minimum cost of breaking the board back down into individual 1×1 pieces. To break the board down, Bob must make cuts along its horizontal and vertical lines.

To reduce the board to squares, x_{n-1} vertical cuts must be made at locations $x_1, x_2, \ldots, x_{n-2}, x_{n-1}$ and y_{m-1} horizontal cuts must be made at locations $y_1, y_2, \ldots, y_{m-2}, y_{m-1}$. Each cut along some x_i (or y_j) has a cost, c_{x_i} (or c_{y_j}). If a cut of cost c passes through n already-cut segments, the total cost of the cut is $n \times c$.

The cost of cutting the whole board down into 1×1 squares is the sum of the cost of each successive cut. Recall that the cost of a cut is multiplied by the number of already-cut segments it crosses through, so each cut is increasingly expensive.

Can you help Bob find the minimum cost?

Input Format

The first line contains a single integer, q, denoting the number of queries. The $3 \cdot q$ subsequent lines describe each query over 3 lines according to the following format:

- 1. The first line has two positive space-separated integers, m and n, detailing the respective height (y) and width (x) of the board.
- 2. The second line has m-1 space-separated integers listing the cost, c_{y_j} , of cutting a segment of the board at each respective location from $y_1, y_2, \ldots, y_{m-2}, y_{m-1}$.
- 3. The third line has n-1 space-separated integers listing the cost, c_{x_i} , of cutting a segment of the board at each respective location from $x_1, x_2, \ldots, x_{n-2}, x_{n-1}$.

Note: If we were to superimpose the $m \times n$ board on a 2D graph, x_0 , x_n , y_0 , and y_n would all be edges of the board and thus not valid cut lines.

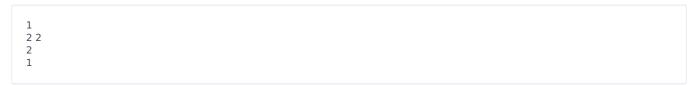
Constraints

- $1 \le q \le 20$
- $2 \le m, n \le 1000000$
- $0 \le c_{x_i}, c_{y_i} \le 10^9$

Output Format

For each of the q queries, find the minimum cost (minCost) of cutting the board into 1×1 squares and print the value of $minCost \% (10^9 + 7)$.

Sample Input 0



4

Explanation 0

We have a 2×2 board, with cut costs $c_{y_1} = 2$ and $c_{x_1} = 1$. Our first cut is horizontal at y_1 , because that is the line with the highest cost (2). Our second cut is vertical, at x_1 . Our first cut has a totalCost of 2, because we are making a cut with cost $c_{y_1} = 2$ across 1 segment (the uncut board). The second cut also has a totalCost of 2, because we are making a cut of cost $c_{x_1} = 1$ across 2 segments. Thus, our answer is $minCost = ((2 \times 1) + (1 \times 2)) \% (10^9 + 7) = 4$.

Sample Input 1

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1
64
21314
412
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Sample Output 1

42

Explanation 1

Our sequence of cuts is: y_5 , x_1 , y_3 , y_1 , x_3 , y_2 , y_4 and x_2 .

Cut 1: Horizontal with cost $c_{y_5}=4$ across 1 segment. $totalCost=4\times 1=4$.

Cut 2: Vertical with cost $c_{x_1}=4$ across 2 segments. totalCost=4 imes 2=8 .

Cut 3: Horizontal with cost $c_{y_3}=3$ across 2 segments. $totalCost=3\times 2=6$.

Cut 4: Horizontal with cost $c_{y_1}=2$ across 2 segments. $totalCost=2\times 2=4$.

Cut 5: Vertical with cost $c_{x_3}=2$ across 4 segments. totalCost=2 imes 4=8 .

Cut 6: Horizontal with cost $c_{y_2}=1$ across 3 segments. totalCost=1 imes 3=3 .

Cut 7: Horizontal with cost $c_{y_4}=1$ across 3 segments. totalCost=1 imes 3=3 .

Cut 8: Vertical with cost $c_{x_2}=1$ across 6 segments. totalCost=1 imes 6=6 .

When we sum the totalCost for all minimum cuts, we get 4+8+6+4+8+3+3+6=42. We then print the value of 42% (10^9+7) .