Flipping the Matrix

by Voidminded

Problem Submissions Leaderboard Discussions

Sean invented a game involving a $2n \times 2n$ matrix where each cell of the matrix contains an integer. He can reverse any of its rows or columns any number of times, and the goal of the game is to maximize the sum of the elements in the $n \times n$ submatrix located in the upper-left corner of the $2n \times 2n$ matrix (i.e., its upper-left quadrant).

Given the initial configurations for q matrices, help Sean reverse the rows and columns of each matrix in the best possible way so that the sum of the elements in the matrix's upper-left quadrant is maximal. For each matrix, print the maximized sum on a new line.

Input Format

The first line contains an integer, q, denoting the number of queries. The subsequent lines describe each of the q queries in the following format:

1. The first line of each query contains an integer, n.
2. Each line i the $2n$ subsequent lines contains $2n$ space-separated integers describing the respective values of row i in the matrix.

Constraints

- $1 \leq q \leq 16$
- $1 \leq n \leq 128$
- $0 \leq matrix[i][j] \leq 4096$, where $0 \leq i, j < 2n$.

Output Format

You must print q lines of output. For each query (i.e., matrix), print the maximum possible sum of the elements in the matrix's upper-left quadrant.

Sample Input

```
1
2
112 42 83 119
56 125 56 49
15 78 101 43
62 98 114 108
```

Sample Output

```
414
```

Explanation

We start out with the following $2n \times 2n$ matrix:

$$matrix = \begin{bmatrix} 112 & 42 & 83 & 119 \\ 56 & 125 & 56 & 49 \\ 15 & 78 & 101 & 43 \\ 62 & 98 & 114 & 108 \end{bmatrix}$$

We can perform the following operations to maximize the sum of the $n \times n$ submatrix in the upper-left corner:

1. Reverse column 2 ($[83, 56, 101, 114] \rightarrow [114, 101, 56, 83]$), resulting in the matrix:

$$matrix = \begin{bmatrix} 112 & 42 & 114 & 119 \\ 56 & 125 & 101 & 49 \\ 15 & 78 & 56 & 43 \\ 62 & 98 & 83 & 108 \end{bmatrix}$$

2. Reverse row 0 ($[112, 42, 114, 119] \rightarrow [119, 114, 42, 112]$), resulting in the matrix:

$$matrix = \begin{bmatrix} 119 & 114 & 42 & 112 \\ 56 & 125 & 101 & 49 \\ 15 & 78 & 56 & 43 \\ 62 & 98 & 83 & 108 \end{bmatrix}$$

When we sum the values in the $n \times n$ submatrix in the upper-left quadrant, we get $119 + 114 + 56 + 125 = 414$. Thus, we print 414 on a new line.

Contest ends in an hour

Submissions: 0
Max Score: 30
Difficulty: Medium

Rate This Challenge:

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Current Buffer (saved locally, editable) Java 8

```
1  import java.io.*;
2  import java.util.*;
3
4  public class Solution {
5
6      public static void main(String[] args) {
7          /* Enter your code here. Read input from STDIN. Print output to STDOUT. Your class should be named Solution. */
8      }
9  }
```

Line: 1 Col: 1

Upload Code as File Test against custom input Run Code Submit Code