

Problem 3537: Fill a Special Grid

Problem Information

Difficulty: Medium

Acceptance Rate: 70.47%

Paid Only: No

Tags: Array, Divide and Conquer, Matrix

Problem Description

You are given a non-negative integer n representing a $2n \times 2n$ grid. You must fill the grid with integers from 0 to $2n^2 - 1$ to make it **special**. A grid is **special** if it satisfies **all** the following conditions:

- * All numbers in the top-right quadrant are smaller than those in the bottom-right quadrant.
- * All numbers in the bottom-right quadrant are smaller than those in the bottom-left quadrant.
- * All numbers in the bottom-left quadrant are smaller than those in the top-left quadrant.
- * Each of its quadrants is also a special grid.

Return the **special** $2n \times 2n$ grid.

Note : Any 1×1 grid is special.

Example 1:

Input: $n = 0$

Output: $[[0]]$

Explanation:

The only number that can be placed is 0, and there is only one possible position in the grid.

Example 2:

Input: $n = 1$

****Output:**** `[[3,0],[2,1]]`

****Explanation:****

The numbers in each quadrant are:

* Top-right: 0 * Bottom-right: 1 * Bottom-left: 2 * Top-left: 3

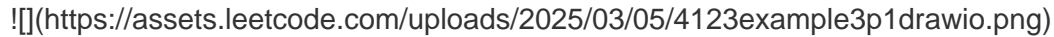
Since $0 < 1 < 2 < 3$, this satisfies the given constraints.

****Example 3:****

****Input:**** `n = 2`

****Output:**** `[[15,12,3,0],[14,13,2,1],[11,8,7,4],[10,9,6,5]]`

****Explanation:****



The numbers in each quadrant are:

* Top-right: 3, 0, 2, 1 * Bottom-right: 7, 4, 6, 5 * Bottom-left: 11, 8, 10, 9 * Top-left: 15, 12, 14, 13 * $\max(3, 0, 2, 1) < \min(7, 4, 6, 5)$ * $\max(7, 4, 6, 5) < \min(11, 8, 10, 9)$ * $\max(11, 8, 10, 9) < \min(15, 12, 14, 13)$

This satisfies the first three requirements. Additionally, each quadrant is also a special grid. Thus, this is a special grid.

****Constraints:****

* $0 \leq n \leq 10$

Code Snippets

C++:

```
class Solution {  
public:  
    vector<vector<int>> specialGrid(int n) {  
  
    }  
};
```

Java:

```
class Solution {  
    public int[][] specialGrid(int n) {  
  
    }  
}
```

Python3:

```
class Solution:  
    def specialGrid(self, n: int) -> List[List[int]]:
```