dev.to

Solution: Pascal's Triangle

4-5 minutes

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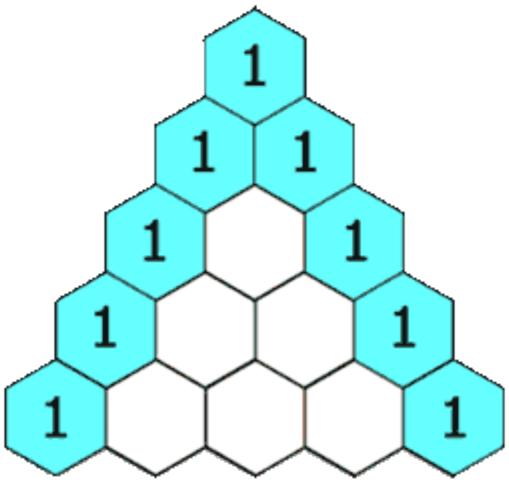
Leetcode Problem #118 (*Easy*): Pascal's Triangle

Description:

(*Jump to*: *Solution Idea* || *Code*: *JavaScript* | *Python* | *Java* | *C++*)

> Given an integer `numRows`, return the first `numRows` of Pascal's triangle.
>
> In Pascal's triangle, each number is the sum of the two numbers directly above it as shown:



Examples:

Example 1:	
Input:	numRows = 5
Output:	[[1],[1,1],[1,2,1],[1,3,3,1],[1,4,6,4,1]]

Example 2:	
Input:	numRows = 1
Output:	[[1]]

Constraints:

- `1 <= numRows <= 30`

Idea:

(*Jump to*: *Problem Description* || *Code*: *JavaScript* | *Python* | *Java* | *C++*)

For this problem, we can do pretty much just as the instructions tell us. We'll iterate through the building of **Pascal's triangle** (**ans**), row by row. When we create each new **row**, we should initially fill it with **1**s so that we don't have to worry about the logic of filling the edge cells that only have one number above.

Then we can start on **j = 1** for each **row** and repeat the process of summing up the value of the current cell until we reach the midpoint (**mid**). Since the triangle is symmetrical, we can actually fill both halves of the row at once, while we work inward.

Once we reach the end of the last row, we can **return ans**.

- ***Time Complexity: O(N)*** *where* ***N*** *is the* ***numRows****th* ***triangular number***
- ***Space Complexity: O(1)***

Javascript Code:

(*Jump to*: [*Problem Description*]() || [*Solution Idea*]())

```
var generate = function(numRows) {
    let ans = new Array(numRows)
    for (let i = 0; i < numRows; i++) {
        let row = new Uint32Array(i+1).fill(1),
            mid = i >> 1
        for (let j = 1; j <= mid; j++) {
            let val = ans[i-1][j-1] + ans[i-1][j]
            row[j] = val, row[row.length-j-1] = val
        }
        ans[i] = row
    }
    return ans
};
```

Python Code:

(*Jump to*: [Problem Description](#) || [Solution Idea](#))

```
class Solution:
    def generate(self, numRows: int) ->
List[List[int]]:
        ans = [None] * numRows
        for i in range(numRows):
            row, mid = [1] * (i + 1), (i >> 1) + 1
            for j in range(1, mid):
                val = ans[i-1][j-1] + ans[i-1][j]
                row[j], row[len(row)-j-1] = val, val
            ans[i] = row
        return ans
```

Java Code:

(*Jump to*: [Problem Description](#) || [Solution Idea](#))

```
class Solution {
    public List<List<Integer>> generate(int numRows)
{
        List<List<Integer>> ans = new
ArrayList<List<Integer>>(numRows);
        for (int i = 0; i < numRows; i++) {
            List<Integer> row = new ArrayList<>(i+1);
            while (row.size() <= i) row.add(1);
            int mid = i >> 1;
            for (int j = 1; j <= mid; j++) {
                int val = ans.get(i-1).get(j-1) +
ans.get(i-1).get(j);
                row.set(j, val);
                row.set(row.size()-j-1, val);
            }
            ans.add(row);
        }
        return ans;
    }
}
```

C++ Code:

(*Jump to*: Problem Description || Solution Idea)

```
class Solution {
public:
    vector<vector<int>> generate(int numRows) {
        vector<vector<int>> ans(numRows);
        for (int i = 0; i < numRows; i++) {
            vector<int> row(i+1, 1);
            int mid = i >> 1;
            for (int j = 1; j <= mid; j++) {
                int val = ans[i-1][j-1] + ans[i-
1][j];
                row[j] = val;
                row[row.size()-j-1] = val;
            }
            ans[i] = row;
        }
        return ans;
    }
};
```