DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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DOMAIN WINTER WINNING CAMP

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VERY EASY

1. N-th Tribonacci Number

The Tribonacci sequence Tn is defined as follows:
T0 = 0, T1 = 1, T2 = 1, and Tn+3 = Tn + Tn+1 + Tn+2 for n >= 0. Given n, return the value of Tn.

Example 1:
Input: n = 4 Output:
4
Explanation:
T_3 = 0 + 1 + 1 = 2
T_4 = 1 + 1 + 2 = 4

Example 2: Input: n = 25
Output: 1389537
Constraints: 0 <= n <= 37
The answer is guaranteed to fit within a 32-bit integer, ie. answer <= 2^31 - 1.

CODE: def tribonacci(n: int) -> int: if n == 0: return 0 if n in (1, 2): return 1
dp = [0, 1, 1] for i in range(3, n + 1):
dp.append(dp[i - 1] + dp[i - 2] + dp[i - 3])
return dp[n] print(tribonacci(4))

```
Output

4

=== Code Execution Successful ===
```

Easy

1.Climbing Stairs

You are climbing a staircase. It takes n steps to reach the top. Each time you can either climb 1 or 2 steps. In how many distinct ways can you climb to the top?

Example 1: Input: n = 2

Output: 2

Explanation: There are two ways to climb to the top.

1.1 step + 1 step

2. 2 steps

Constraints:1 <= n <= 45

CODE: def climbStairs(n: int) -
> int: if n == 1: return 1
dp = [0] * (n + 1) dp[1], dp[2]
= 1, 2 for i in range(3, n + 1):
dp[i] = dp[i - 1] + dp[i - 2]
return dp[n] print(climbStairs(2))
Output: 2

```
Output

2

=== Code Execution Successful ===
```

***Medium*:**

2.Longest Palindromic Substring

Given a string s, return the longest palindromic substring in s.

Example 1: Input: s = "babad"

Output: "bab"

Explanation: "aba" is also a valid answer.

Example 2: Input: s = "cbbd"

Output: "bb"

Constraints: 1 <= s.length <= 1000 s
consist of only digits and English letters.

CODE: def longestPalindrome(s: str) -> str: def
expand_around_center(left, right): while left >= 0 and right < len(s) and
s[left] == s[right]: left -= 1 right += 1 return left + 1, right
- 1

```
start, end = 0, 0 for i in range(len(s)): l1, r1 = expand_around_center(i, i) l2, r2 = expand_around_center(i, i + 1) if r1 - l1 > end - start: start, end = l1, r1 if r2 - l2 > end - start: start, end = l2, r2 return s[start:end + 1]
print(longestPalindrome("babad")) # Output: "bab" or "aba"
```

```
Output
bab

=== Code Execution Successful ===
```

Hard

3.Maximal Rectangle

Given a rows x cols binary matrix filled with 0's and 1's, find the largest rectangle containing only 1's and return its area.

Example-

1	0	1	0	0
1	0	1	1	1
1	1	1	1	1
1	0	0	1	0

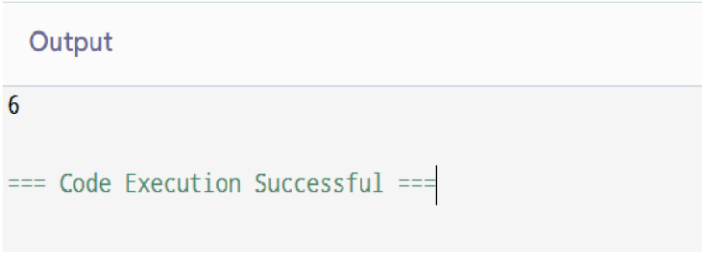
Input:matrix= [["1","0","1","0","0"],["1","0","1","1","1"],["1","1","1","1","1"], ["1","0","0","1","0"]]
Output: 6
Explanation: The maximal rectangle is shown in the above picture.

Constraints: rows == matrix.length cols == matrix[i].length 1 <= row, cols <= 200 matrix[i][j] is '0' or '1'.

CODE:

```
def maximalRectangle(matrix): if not matrix: return 0
```

```
def largest_histogram_area(heights): stack = [] max_area = 0 heights.append(0) for i, h in enumerate(heights): while stack and heights[stack[-1]] > h: height = heights[stack.pop()] width = i if not stack else i - stack[-1] - 1 max_area = max(max_area, height * width) stack.append(i) return max_area cols = len(matrix[0]) heights = [0] * cols max_area = 0 for row in matrix: for j in range(cols): heights[j] = heights[j] + 1 if row[j] == "1" else 0 max_area = max(max_area, largest_histogram_area(heights)) return max_area
matrix = [["1", "0", "1", "0", "0"], ["1", "0", "1", "1", "1"], ["1", "1", "1", "1", "1"], ["1", "0", "0", "1", "0"]] print(maximalRectangle(matrix))
```



Very Hard

4. Cherry Pickup

You are given an n x n grid representing a field of cherries, each cell is one of three possible integers.

0 means the cell is empty, so you can pass through,

1 means the cell contains a cherry that you can pick up and pass through, or -1 means the cell contains a thorn that blocks your way.

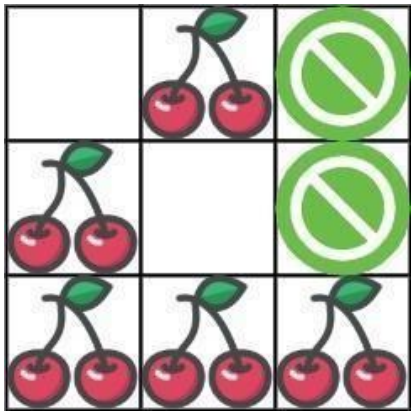
Return the maximum number of cherries you can collect by following the rules below: Starting at the position (0, 0) and reaching (n - 1, n - 1) by moving right or down through valid path cells (cells with value 0 or 1).

After reaching (n - 1, n - 1), returning to (0, 0) by moving left or up through valid path cells.

When passing through a path cell containing a cherry, you pick it up, and the cell becomes an empty cell

0.

If there is no valid path between (0, 0) and (n - 1, n - 1), then no cherries can be collected.



Input: grid = [[0,1,-1],[1,0,-1],[1,1,1]]
Output: 5
Explanation: The player started at (0, 0) and went down, down, right right to reach (2, 2). 4 cherries were picked up during this single trip, and the matrix becomes [[0,1,-1],[0,0,-1], [0,0,0]].
Then, the player went left, up, up, left to return home, picking up one more cherry. The total number of cherries picked up is 5, and this is the maximum possi