



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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WORKSHEET 6

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Section/Group: 22BCS_NTPP-602-A

Semester: 6th

Date of Performance: 20/02/2025

Subject Name: AP LAB - II

Subject Code: 22CSP-351

1. **Aim:** Given an integer array nums representing the amount of money of each house, return the maximum amount of money you can rob tonight without alerting the police1

2. Source Code:

```
def rob(self, nums: List[int]) -> int:

    if not nums:

        return 0

    if len(nums) == 1:

        return nums[0]

    prev, curr = 0, 0

    for num in nums:

        prev, curr = curr, max(curr, prev + num)

    return curr
```



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3. Screenshots of outputs:

Testcase | Test Result

Accepted Runtime: 0 ms

Case 1 Case 2

Input

nums =
[2, 7, 9, 3, 1]

Output

12

Expected

12

Accepted 70 / 70 testcases passed

jayantsharma... submitted at Feb 24, 2025 10:52

Editorial Solution

Runtime

0 ms | Beats 100.00%

Analyze Complexity

Memory

17.74 MB | Beats 54.10%

100% 50% 0%

1ms 2ms 3ms 4ms



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2. Aim: Given the two integers m and n, return the number of possible unique paths that the robot can take to reach the bottom-right corner.

Source Code

class Solution:

```
def uniquePaths(self, m: int, n: int) -> int:
```

```
    dp = [[1] * n for _ in range(m)]
```

```
    for i in range(1, m):
```

```
        for j in range(1, n):
```

```
            dp[i][j] = dp[i - 1][j] + dp[i][j - 1]
```

```
    return dp[-1][-1]
```

Screenshots of outputs:

Accepted Runtime: 0 ms

• Case 1 • Case 2

Input

m =
3

n =
7

Output

28

Expected

28

Accepted 63 / 63 testcases passed
jayantsh... submitted at Feb 24, 2025 10:55

Editorial Solution

Runtime
0 ms | Beats 100.00% 🏆
[Analyze Complexity](#)

Memory
17.66 MB | Beats 88.32% 🏆

Memory Usage Bin	Percentage
1ms	~65%
2ms	~5%
3ms	~10%
4ms	~5%



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3. Aim: Given an integer array `nums`, find a subarray that has the largest product, and return the product.

Source Code:

class Solution:

```
def maxProduct(self, nums: List[int]) -> int:
```

```
    max_prod = min_prod = result = nums[0]
```

```
    for num in nums[1:]:
```

```
        temp_max = max(num, max_prod * num, min_prod * num)
```

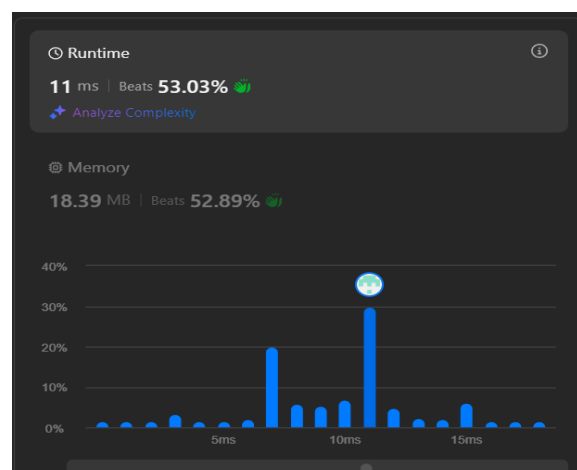
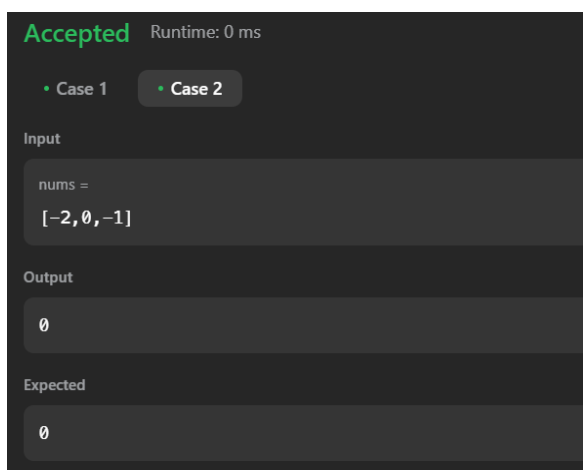
```
        min_prod = min(num, max_prod * num, min_prod * num)
```

```
        max_prod = temp_max
```

```
        result = max(result, max_prod)
```

```
    return result
```

Screenshots of outputs:





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4. Aim: Given an integer n , return *the least number of perfect square numbers that sum to n .*

Source Code:

```
class Solution:
    def numSquares(self, n: int) -> int:
        dp = [float('inf')] * (n + 1)
        dp[0] = 0

        for i in range(1, n + 1):
            for j in range(1, int(math.sqrt(i)) + 1):
                dp[i] = min(dp[i], dp[i - j * j] + 1)

        return dp[n]
```

4. Screenshots of outputs:

Testcase Test Result

Accepted Runtime: 0 ms

Case 1 Case 2

Input

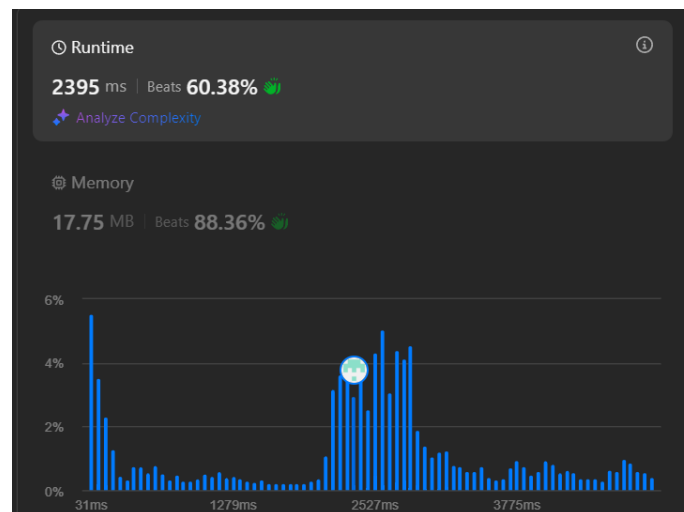
n =
12

Output

3

Expected

3





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Learning Outcomes:

- Binary Tree Construction:* Efficiently reconstruct a binary tree from inorder and postorder traversals using recursion and hash maps.
- Dynamic Programming (DP) Concepts:* Applying DP to solve problems like the minimum number of perfect squares summing to n , unique paths in a grid, and house robber problem.
- State Transition Optimization:* Utilizing DP and variable swapping to optimize space complexity, as seen in `rob()` and `maxProduct()`.
- Mathematical Approaches:* Understanding how mathematical properties like square numbers and factorial-based paths contribute to problem-solving.
- Algorithmic Thinking:* Developing problem-solving skills with recursive tree construction, iterative DP, and greedy strategies for maximizing results.