2023-08-12 - Handout – Dynamic Programming I

# Q1. Climbing Stairs

Link: <https://leetcode.com/problems/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?

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| **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 | **Example 2:**  **Input:** n = 3 **Output**: 3 **Explanation**: There are three ways to climb to the top.  1. 1 step + 1 step + 1 step 2. 1 step + 2 steps 3. 2 steps + 1 step |

# Q2. House Robber

Link: <https://leetcode.com/problems/house-robber/>

You are a professional robber planning to rob houses along a street. Each house has a certain amount of money stashed, the only constraint stopping you from robbing each of them is that adjacent houses have security systems connected and **it will automatically contact the police if two adjacent houses were broken into on the same night**.

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 police***.

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| **Example 1:**  **Input:** nums = [1,2,3,1] **Output**: 4 **Explanation**: Rob house 1 (money = 1) and then rob house 3 (money = 3). Total amount you can rob = 1 + 3 = 4. | **Example 2:**  **Input:** nums = [2,7,9,3,1] **Output**: 12 **Explanation**: Rob house 1 (money = 2), rob house 3 (money = 9) and rob house 5 (money = 1). Total amount you can rob = 2 + 9 + 1 = 12. |

# Q3. Longest Palindromic Substring

Link: <https://leetcode.com/problems/longest-palindromic-substring/>

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

Palindromic: A string is palindromic if it reads the same forward and backward.

Substring: A substring is a contiguous non-empty sequence of characters within a string.

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| **Example 1:**  **Input:** s = "babad" **Output**: "bab" **Explanation**: "aba" is also a valid answer. | **Example 2:**  **Input:** s = "cbbd" **Output**: "bb" |

# Q4. Coin Change

Link: <https://leetcode.com/problems/coin-change/>

You are given an integer array coins representing coins of different denominations and an integer amount representing a total amount of money.

Return *the fewest number of coins that you need to make up that amount*. If that amount of money cannot be made up by any combination of the coins, return -1.

You may assume that you have an infinite number of each kind of coin.

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| **Example 1:**  **Input:** coins = [1,2,5], amount = 11 **Output**: 3 **Explanation**: 11 = 5 + 5 + 1  **Example 3:**  **Input:** coins = [1], amount = 0 **Output**: 0 | **Example 2:**  **Input:** coins = [2], amount = 3 **Output**: -1 |