SDE Intern DSA Practice Questions

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1. Two Sum (Array + Hashing)

Problem:
Given an array of integers `nums` and an integer `target`, return the indices of the two numbers such that they add up to `target`.

You may assume that:

- Each input has exactly one solution.
- You may not use the same element twice.

Example:

```
Input: nums = [2,7,11,15], target = 9
Output: [0,1]
```

Concepts Tested:

- HashMap
- Optimized lookup
- Time complexity improvement

Expected Complexity:

- Time: O(n)
- Space: O(n)

2. Best Time to Buy and Sell Stock

Problem:
You are given an array `prices` where `prices[i]` is the price of a stock on day `i`.

Find the maximum profit you can achieve from one transaction (buy once and sell once). If no profit is possible, return 0.

Example:

```
Input: [7,1,5,3,6,4]
Output: 5
```

Concept Tested:

- Greedy approach
- Tracking minimum value
- Single pass optimization

Expected Complexity:

- Time: O(n)
- Space: O(1)

3. Valid Parentheses

Problem:
Given a string `s` containing just the characters `( ), { }, [ ]`, determine if the input string is valid.

A string is valid if:

1. Open brackets are closed by the same type of brackets.
2. Open brackets are closed in the correct order.

Example:

```
Input: "()[]{}"
Output: true
```

Concept Tested:

- Stack
- LIFO principle
- Matching pairs

Expected Complexity:

- Time: O(n)
- Space: O(n)