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import re

# 1. Find Missing Number
def find_missing_number(arr, n):
    total = (n * (n + 1)) // 2
    return total - sum(arr)

# 2. Check Balanced Parentheses
def is_balanced_parentheses(s):
    stack = []
    mapping = {')': '(', '}': '{', ']': '['}
    for char in s:
        if char in mapping:
            top_element = stack.pop() if stack else '#'
            if mapping[char] != top_element:
                return False
        else:
            stack.append(char)
    return not stack

# 3. Longest Word in a Sentence
def longest_word(sentence):
    words = sentence.split()
    return max(words, key=len)

# 4. Count Words in a Sentence
def count_words(sentence):
    return len(sentence.split())

# 5. Check Pythagorean Triplet
def is_pythagorean_triplet(a, b, c):
    x, y, z = sorted([a, b, c])
    return x**2 + y**2 == z**2

# 6. Bubble Sort
def bubble_sort(arr):
    n = len(arr)
    for i in range(n):
        for j in range(0, n-i-1):
            if arr[j] > arr[j+1]:
                arr[j], arr[j+1] = arr[j+1], arr[j]
    return arr

# 7. Binary Search
def binary_search(arr, target):
    left, right = 0, len(arr) - 1
    while left <= right:
        mid = (left + right) // 2
        if arr[mid] == target:
            return mid
        elif arr[mid] < target:
            left = mid + 1
        else:
            right = mid - 1
    return -1

# 8. Find Subarray with Given Sum
def find_subarray_with_sum(arr, target):
    curr_sum = 0
    left = 0
    for right in range(len(arr)):
        curr_sum += arr[right]
        while curr_sum > target and left <= right:
            curr_sum -= arr[left]
            left += 1
        if curr_sum == target:
            return arr[left:right+1]
    return -1

# 9. Log Analysis System (Extract most frequent IP)
def analyze_logs(logs):
    ip_counts = {}
    for log in logs:
        match = re.search(r'\b(?:[0-9]{1,3}\.){3}[0-9]{1,3}\b', log)
        if match:
            ip = match.group()
            ip_counts[ip] = ip_counts.get(ip, 0) + 1
    return max(ip_counts, key=ip_counts.get, default=None)

# Testing the functions
print("Missing number:", find_missing_number([1, 2, 4, 5, 6], 6))
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print("Balanced Parentheses:", is_balanced_parentheses("{[()]}"))
print("Longest Word:", longest_word("Python is amazing"))
print("Word Count:", count_words("Python is amazing"))
print("Pythagorean Triplet:", is_pythagorean_triplet(3, 4, 5))
print("Bubble Sort:", bubble_sort([64, 34, 25, 12, 22, 11, 90]))
print("Binary Search:", binary_search([1, 2, 3, 4, 5], 3))
print("Subarray with Given Sum:", find_subarray_with_sum([1, 4, 20, 3, 10, 5], 33))
print("Most Frequent IP:", analyze_logs(["192.168.1.1 - GET /index.html", "192.168.1.1 - POST /data", "10.0.0.1 - GET /home"]))
```

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Missing number: 3
Balanced Parentheses: True
Longest Word: amazing
Word Count: 3
Pythagorean Triplet: True
Bubble Sort: [11, 12, 22, 25, 34, 64, 90]
Binary Search: 2
Subarray with Given Sum: [20, 3, 10]
Most Frequent IP: 192.168.1.1
```