Full-Stack Web Development

Problem Statement: 1

Design and develop a functional web application that performs basic number-based calculations using JavaScript functions. The application should provide a user-friendly interface to perform these calculations and display the results clearly.

Core Information Requirements

The system must handle the following information:

- **Input Array:** A list of numbers, pre-defined or user-provided, to perform calculations on.
- **Fibonacci Series Limit:** A single number to define the length of the series to be generated.

Functional Requirements

The application must perform the following actions:

- **Sum of an Array:** Calculate and display the sum of all numbers in a given array.
- **Sum of Odd and Even Numbers:** Calculate and display the separate sums of odd and even numbers from an array.
- **Generate Fibonacci Series:** Generate a Fibonacci series up to a user-defined number and display the result.

Technical Specifications

- **Data Structure:** The core calculations must be implemented using a JavaScript **array** to store the numbers.
- **User Interface:** An interface built with **HTML** and a minimal amount of **CSS** to allow user interaction and display results.
- **Programming Language: JavaScript** for all application logic, using only non-arrow functions.

Testing Requirements

The following test cases must be performed to ensure the system functions correctly:

Sum of Array Test:

- **Test Case 1.1:** Provide an array of positive integers, e.g., [1, 2, 3].
    - **Expected Result:** The sum 6 is displayed.
- **Test Case 1.2:** Provide an array with a mix of positive and negative numbers, e.g., [5, -2, 8].
    - **Expected Result:** The sum 11 is displayed.

Sum of Odd and Even Numbers Test:

- **Test Case 2.1:** Provide an array, e.g., [1, 2, 3, 4].
    - **Expected Result:** The sum of odd numbers is 4 and the sum of even numbers is 6.
- **Test Case 2.2:** Provide an array with only odd numbers, e.g., [7, 9, 1].
    - **Expected Result:** The sum of odd numbers is 17 and the sum of even numbers is 0.

Fibonacci Series Test:

- **Test Case 3.1:** Generate a series up to a length of 5.
    - **Expected Result:** The series [0, 1, 1, 2, 3] is displayed.
- **Test Case 3.2:** Generate a series for a length of 10.
    - **Expected Result:** The series [0, 1, 1, 2, 3, 5, 8, 13, 21, 34] is displayed.

Learning Objectives

Upon completion of this project, students will be able to:

- **Core Concepts:** Understand and apply the fundamental concepts of **JavaScript arrays**, including creating, iterating over them, and accessing elements.
- **JavaScript Functions:** Write and use **JavaScript functions** (non-arrow functions) to encapsulate logic and organize code.
- **Event Handling:** Use **event handling** to make the web application interactive, responding to user actions like button clicks.
- **HTML/CSS/JS Integration:** Integrate **HTML** for structure, **CSS** for styling, and **JavaScript** for dynamic functionality to create a working web application.
- **Problem-Solving:** Break down a larger problem (number calculations) into smaller, manageable tasks and implement solutions for each.
- **Logic and Conditionals:** Utilize **conditional statements** (if/else) and **loops** (for) to handle different scenarios and perform iterative calculations.