**Assignment 2 - Computational problem solving**

**Sree Durga Koppula(U91336924)**

**1. Find Missing Numbers in Array**

Summary: Finds all the numbers missing from the array in the range 1 to n

Remarks:

Prompts Used: Help me implement a function to find missing numbers from an unsorted array from 1 to n.

Responses Received: Used index marking technique with Math.Abs and negation to track presence of numbers.

Implementation Details: Co-pilot suggested iterating and marking visited indexes negative, then collecting unmarked positions.

Adjustments: Minor logic validation added to ensure index bounds.

**2. Sort Array by Parity**

Summary: Sorts the array so that even elements come before odd elements.

Remarks:

Prompts Used: Help with sorting array by parity using two pointers.

Responses Received: Co-pilot suggested two-pointer swap logic using modulo operator.

Implementation Details: Two-pointer logic was implemented directly as suggested by Co-pilot.

Adjustments: Validated edge cases for 0s and minimum length arrays.

**3. Two Sum**

Summary: Finds indices of the two numbers that add up to a specific target.

Remarks:

Prompts Used: How to solve Two Sum using dictionary/hashmap.

Responses Received: Dictionary-based lookup was suggested for O(n) time complexity.

Implementation Details: Implemented dictionary lookup for complements as suggested by Co-pilot.

Adjustments: None.

**4. Find Maximum Product of Three Numbers**

Summary: Returns the maximum product of any three numbers in the array.

Remarks:

Prompts Used: Asked for logic to find maximum product of three numbers from an array.

Responses Received: Co-pilot suggested sorting and checking both ends of the array.

Implementation Details: Implemented using Array.Sort and Math.Max as advised.

Adjustments: Verified handling of negatives and small arrays manually.

**5. Decimal to Binary**

Summary: Converts a decimal number to its binary string representation.

Remarks:

Prompts Used: Convert a number to binary string in C#.

Responses Received: Co-pilot recommended using Convert.ToString(number, 2).

Implementation Details: Used method exactly as suggested.

Adjustments: None.

**6. Find Minimum in Rotated Sorted Array**

Summary: Finds the minimum value in a rotated sorted array using binary search.

Remarks:

Prompts Used: Binary search to find minimum in rotated sorted array.

Responses Received: Co-pilot provided mid-point logic to narrow the search.

Implementation Details: Applied binary search loop and conditions exactly as described.

Adjustments: Verified logic using edge test cases.

**7. Palindrome Number**

Summary: Checks whether an integer is a palindrome (same forward and backward).

Remarks:

Prompts Used: Check if a number is a palindrome using integer logic.

Responses Received: Co-pilot suggested reversing the digits instead of string conversion.

Implementation Details: Implemented reversal using modulo and division.

Adjustments: None.

**8. Fibonacci Number**

Summary: Computes the nth Fibonacci number iteratively.

Remarks:

Prompts Used: Efficient way to calculate Fibonacci numbers without recursion.

Responses Received: Co-pilot recommended using an iterative approach with two variables.

Implementation Details: Used for-loop and temp variable swapping for O(n) time.

Adjustments: Base case for n <= 1 explicitly handled.