# Prompts Summary for Coding Assistance

# Find Missing Numbers

**Prompts Used:**

* Why is my FindMissingNumbers method not returning correct missing values
* Can I use a for loop to find missing values without using extra space
* How can I avoid duplicates when finding missing numbers

**Response Received:**• Suggested using a sorted array and comparing adjacent values. Recommended avoiding duplicates with a continue statement and adding missing numbers using a nested loop.

**Implementation Details:**• The FindMissingNumbers method was rewritten to sort the array and compare gaps between consecutive values using a for loop. Copilot’s idea to skip duplicates using continue was used.

**Adjustments Made:**• Initial logic had bugs with duplicates and off-by-one errors. AI logic using sorted array and nested loop was easier to understand and implement.

# Sort Array by Parity

**Prompts Used:**

* How do I separate even and odd numbers using two pointers?
* How to use a for-each loop to reorder array with even numbers first?

**Response Received:**• Recommended using two pointers (start and end) in a new array to place even numbers first and odd numbers last.

**Implementation Details:**• For SortArrayByParity, a two-pointer technique was implemented exactly as suggested to avoid extra memory allocations.

**Adjustments Made:**• Original idea was unclear. AI's two-pointer approach made the code simple and readable.

# Two Sum

**Prompts Used:**

* How can I find two numbers that sum to a target in an array?
* What’s the best way to return indices of two elements adding up to a value?

**Response Received:**• Advised using a dictionary to store values and their indices for fast look-up to achieve O(n) time complexity.

**Implementation Details:**• In TwoSum, a dictionary-based O(n) solution was implemented as per the AI's advice.

**Adjustments Made:**• Tried brute force (O(n²)) first, but replaced with dictionary method for better performance.

# Max Product of Three Numbers

**Prompts Used:**

* How can I find the max product without sorting the array?
* What’s a faster way to calculate max product of 3 numbers in O(n)?

**Response Received:**• Suggested an optimized linear solution using five variables to track the three largest and two smallest values. Compared products to return the maximum.

**Implementation Details:**• The MaximumProduct method was modified from sorting-based to a single-pass logic using 5 variables, which significantly improved performance.

**Adjustments Made:**• Switched from sorting to a single-pass approach to improve both speed and space.

# Decimal to Binary

**Prompts Used:**

* How do I convert decimal to binary without using Convert.ToString?
* Can I build binary string using loop and modulus?

**Response Received:**• Proposed building the binary string using a loop, % 2, and inserting characters in reverse to avoid built-in methods.

**Implementation Details:**• Binary conversion was done using a while loop and modulus as suggested by AI, rather than using .ToString().

**Adjustments Made:**• Initially used Convert.ToString(), but changed to manual logic to meet assignment rules.

# Minimum in Rotated Sorted Array

**Prompts Used:**

* How do I find min in rotated array using binary search?
* What’s the base case when rotated sorted array has no rotation?

**Response Received:**• Offered a binary search solution that checks the middle value and moves either left or right depending on where the minimum lies.

**Implementation Details:**• For finding the minimum in a rotated array, Copilot's binary search logic was followed, reducing complexity from O(n) to O(log n).

**Adjustments Made:**• First wrote a linear search. Changed to binary search after learning from AI that it can be optimized.

# Palindrome Number

**Prompts Used:**

* How can I reverse an integer and check if it’s a palindrome?
* What edge cases do I need for negative numbers?

**Response Received:**• Recommended reversing half of the integer and comparing it with the other half. Cautioned against negative and trailing zero cases.

**Implementation Details:**• The palindrome check used string reversal first, but was improved to a number-based approach per AI's suggestion.

**Adjustments Made:**• Used string conversion but learned how to reverse the number mathematically for better space usage.

# Fibonacci Number

**Prompts Used:**

* Can I find Fibonacci without recursion?
* How do I use iteration to get nth Fibonacci number?

**Response Received:**• Suggested an iterative solution with two variables (a, b) to calculate Fibonacci in O(n) time without recursion.

**Implementation Details:**• Fibonacci was implemented using a loop instead of recursion, based on AI feedback.

**Adjustments Made:**• Replaced recursion with iteration to avoid stack overflow and improve performance.