Assignment 2 AI assistance

General Assistance Summary

* I opted to use **ChatGPT** instead of GitHub Copilot, as I am more comfortable with its interface and ability to explain logic clearly.
* One of the most helpful uses of ChatGPT was in **translating my Python DSA knowledge to C#**. Since I'm well-versed in Python, I used it to understand how similar logic and syntax could be applied in C#.
* I also used ChatGPT to **identify and understand potential edge cases** for each problem. This helped me ensure my code handled various scenarios robustly.
* Finally, I used **Grammarly** to review and correct grammar in my documentation to maintain clarity and professionalism.

Summary of question specific prompt and response

* Question 1  
  Prompts Used:

How do I find missing numbers in an array in C# without using HashSet?

What’s the best way to avoid duplicate interference when finding missing values?

How can I use a boolean array instead of a set to track existing values?

Responses Received:

ChatGPT recommended using a boolean array to mark each value seen, then iterating from 1 to the max value to find unmarked entries.

Implementation Details:  
Used a bool[] array to mark seen values and looped through to find and return the missing ones in a List.

Adjustments:  
Handled edge cases like duplicates and complete range presence. Avoided out-of-bound issues using checks.

Question 2:

* Prompts Used:

How can I group even numbers before odd numbers in an array without sorting the entire array?

Can I use a two-pointer method in C# to achieve parity sorting?

Should I return a new array or modify the same array in place?

Responses Received:  
ChatGPT explained the in-place two-pointer approach for swapping values based on parity.

Implementation Details:  
Implemented the two-pointer method with condition-based swapping of odd/even values.

Adjustments:  
Avoided use of LINQ or libraries and performed swapping manually using a temp variable.

Question 3:

Prompts Used:

How can I implement two sum without using a map or dictionary in C#?

What’s the simplest way to find a pair of indices with a given sum?

Is it okay to return the first pair found?

Responses Received:  
ChatGPT suggested a double-loop brute-force method for checking all index pairs and returning the first valid pair.

Implementation Details:  
Used nested for-loops to compare every index pair for sum equality with the target value.

Adjustments:  
Handled the no-match case by returning an empty array.

Question 4:

Prompts Used:

How do I calculate the max product of 3 integers in a list that includes negatives?

Why consider both top 3 values and product of 2 smallest and largest?

Can I write my own bubble sort to avoid built-in sort?

Responses Received:  
ChatGPT explained the two-product approach and confirmed that using bubble sort is acceptable under constraints.

Implementation Details:  
Manually sorted the array using nested loops and calculated the max of two products.

Adjustments:  
Used temp variable for swap, avoided Array Sort completely, and tested on positive and negative combinations.

Question 5:

Prompts Used:

How do I convert a decimal number to binary manually in C# without using inbuilt libraries?

Can I build the binary string using remainder and division?

How should I handle input of zero?

Responses Received:  
ChatGPT suggested dividing by 2 repeatedly and prepending the remainder to the binary string.

Implementation Details:  
Used while loop and modulus to construct binary from remainders.

Adjustments:  
Special case added for 0 input, as suggested by the tool.

Question 6

Prompts Used:

How to use binary search to find the minimum in a rotated sorted array?

What logic ensures I’m picking the correct side of the array?

What edge cases should I be aware of for small arrays?

Responses Received:  
ChatGPT recommended comparing mid and right to decide which half to explore and mentioned the edge case of sorted but not rotated arrays.

Implementation Details:  
Implemented binary search using left, right, and mid pointers to find the pivot.

Adjustments:  
Tested behavior on 1-element, sorted, and multi-rotated arrays.

Question 7

Prompts Used:

Can I check if a number is a palindrome in C# without converting it to string?

How do I reverse a number mathematically?

Should I handle negative numbers separately?

Responses Received:  
ChatGPT explained using modulus and division to reverse the number and compare it to the original, while handling negatives up front.

Implementation Details:  
Reversed the integer and compared with the original to confirm palindrome status.

Adjustments:  
Early return for negative numbers added before reversal logic.

Question 8

Prompts Used:

How do I find the nth Fibonacci number without recursion?

What variables do I use to calculate Fibonacci iteratively?

How do I handle n = 0 or 1 as special cases?

Responses Received:  
ChatGPT recommended initializing two variables and looping to calculate the next values up to n.

Implementation Details:  
Implemented a for loop with two tracking variables a and b, iteratively updated for each step.

Adjustments:  
Returned `n` directly if it's 0 or 1 to prevent unnecessary computation.