C# Day 4

Part 01 - Questions

Q1: What is the default value assigned to array elements in C#?

Answer: The default value is `0` for numeric types (int, double, etc.), `false` for bool, and `null` for reference types.

Q2: What is the difference between Array.Clone() and Array.Copy()?

Answer: `Array.Clone()` creates a shallow copy of the entire array and returns an object that must be cast. `Array.Copy()` allows copying a specific number of elements from one array to another with more control over source and destination indices.

Q3: What is the difference between GetLength() and Length for multi-dimensional arrays?

Answer: `GetLength(dimension)` returns the number of elements in a specific dimension (e.g., rows or columns). `Length` returns the total number of elements in all dimensions combined.

Q4: What is the difference between Array.Copy() and Array.ConstrainedCopy()?

Answer: `Array.Copy()` performs a copy and may leave the destination array in a partially copied state if an error occurs. `Array.ConstrainedCopy()` is atomic - either all elements are copied successfully or none are, ensuring data integrity.

Q5: Why is foreach preferred for read-only operations on arrays?

Answer: `foreach` is cleaner, more readable, and prevents accidental modification of array elements. It also eliminates index-out-of-bounds errors and makes the intent clear that you're only reading data.

Q6: Why is input validation important when working with user inputs?

Answer: Input validation prevents runtime errors, crashes, and security vulnerabilities. It ensures data integrity and provides a better user experience by catching invalid data before processing.

Q7: How can you format the output of a 2D array for better readability?

Answer: Use `\t` or `String.Format()` to align columns. Print elements in nested loops with proper spacing and add line breaks after each row.

Q8: When should you prefer a switch statement over if-else?

Answer: Use `switch` when comparing a single variable against multiple discrete values. It's more readable, potentially more efficient, and better expresses the intent of selecting from multiple options.

Q9: What is the time complexity of Array.Sort()?

Answer: The time complexity is **O(n log n)** on average, where n is the number of elements. It uses an introspective sort algorithm (QuickSort, HeapSort, , InsertionSort).

Q10: Which loop (for or foreach) is more efficient for calculating the sum of an array, and why?

Answer: Both have similar performance for arrays. `for` may be slightly faster as it directly accesses array indices, while `foreach` uses an enumerator. However, the difference is negligible and `foreach` is preferred for readability.

Part 02 - Questions

Q11: What happens if the user enters a value outside the range of 1 to 7 in the DayOfWeek enum program?

Answer: The program validates input using `int.TryParse()` and checks if the value is between 1 and 7. If outside this range, it displays "Invalid" message and doesn't attempt to parse the enum, preventing errors.