Part01

- **Problem**: Write a program that:
  - Initializes a one-dimensional array in three different ways (`new int[size]`, initializer list, and `Array` syntax sugar).
  - Assigns values to each element in the array and prints them.
  - Demonstrates an `IndexOutOfRangeException`.
- **Question**: What is the default value assigned to array elements in C#?

- **Problem**: Write a program to:
  - Create two arrays (`arr1` and `arr2`).
  - Perform a shallow copy and demonstrate how modifying one affects the other.
  - Perform a deep copy using the `Clone` method and show that modifications do not affect the copied array.
- **Question**: What is the difference between `Array.Clone()` and `Array.Copy()`?

- **Problem**: Write a program to:
  - Create a 2D array with student grades (3 students, 3 subjects each).
  - Take input from the user to fill the array.
  - Print the grades for each student using nested loops.
- **Question**: What is the difference between `GetLength()` and `Length` for multi-dimensional arrays?

- **Problem**: Write a program that:
  - Demonstrates at least 5 array methods (`Sort`, `Reverse`, `IndexOf`, `Copy`, `Clear`).
  - Explains the changes before and after applying each method.
- **Question**: What is the difference between `Array.Copy()` and `Array.ConstrainedCopy()`?

- **Problem**: Create a program that:
  - Uses a `for` loop to print all elements of a 1D array.
  - Uses a `foreach` loop to print all elements of the same array.
  - Uses a `while` loop to print all elements in reverse order.
- **Question**: Why is `foreach` preferred for read-only operations on arrays?

- **Problem**: Write a program that:
  - Repeatedly asks the user for a positive odd number.
  - Uses defensive coding to validate input using `int.TryParse` and a `do-while` loop.
- **Question**: Why is input validation important when working with user inputs?

- **Problem**: Write a program to:
  - Create a 2D array with fixed values.
  - Print the array elements in a matrix format (rows and columns).
- **Question**: How can you format the output of a 2D array for better readability?

- **Problem**: Write a program that:
  - Asks the user to enter a month number.
  - Uses an `if-else` statement to determine the month name.
  - Uses a `switch` statement to perform the same task.
- **Question**: When should you prefer a `switch` statement over `if-else`?

- **Problem**: Write a program to:
  - Sort an array of integers using `Array.Sort()`.
  - Search for a specific value using `Array.IndexOf()` and `Array.LastIndexOf()`.
- **Question**: What is the time complexity of `Array.Sort()`?

- **Problem**: Write a program that:
  - Creates an array of integers.
  - Uses a `for` loop to calculate and print the sum of all elements.
  - Uses a `foreach` loop to calculate the same sum.
- **Question**: Which loop (`for` or `foreach`) is more efficient for calculating the sum of an array, and why?

Part02

1- LinkedIn article about loops statements in Csharp
2- Define an `enum` called `DayOfWeek` with values: `Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday`.

   Write a program that takes an integer input from the user (1-7) and prints the corresponding day using the `enum`.

   Use `Enum.Parse` to convert an integer to an enum value.

3- What happens if the user enters a value outside the range of 1 to 7?

Part03 Bonus

4- self study report

5- what's the default size of stack and heap and what are the consideration

6- what is time complexity