Assignment 1

1. The Bubble Sort algorithm has a time complexity of O(n^2) in its worst and average cases, which makes it inefficient for large datasets. How we can optimise the Bubble Sort algorithm
   And implement the code of this optimised bubble sort algorithm

2. create a generic Range<T> class that represents a range of values from a minimum value to a maximum value. The range should support basic operations such as checking if a value is within the range and determining the length of the range.
   Requirements:
   1. Create a generic class named Range<T> where T represents the type of values.
   2. Implement a constructor that takes the minimum and maximum values to define the range.
   3. Implement a method IsInRange(T value) that returns true if the given value is within the range, otherwise false.
   4. Implement a method Length() that returns the length of the range (the difference between the maximum and minimum values).
   5. Note: You can assume that the type T used in the Range<T> class implements the IComparable<T> interface to allow for comparisons.

3. You are given an **ArrayList** containing a sequence of elements. try to reverse the order of elements in the **ArrayList** in-place(in the same arrayList) without using the built-in **Reverse**. Implement a function that takes the **ArrayList** as input and modifies it to have the reversed order of elements.

4. You are given a list of integers. Your task is to find and return a new list containing only the even numbers from the given list.

5. implement a custom list called **FixedSizeList<T>** with a predetermined capacity. This list should not allow more elements than its capacity and

should provide clear messages if one tries to exceed it or access invalid indices.

Requirements:

1. Create a generic class named **FixedSizeList<T>**.
2. Implement a constructor that takes the fixed capacity of the list as a parameter.
3. Implement an **Add** method that adds an element to the list, but throws an exception if the list is already full.
4. Implement a **Get** method that retrieves an element at a specific index in the list but throws an exception for invalid indices.

6. Given a string, find the first non-repeated character in it and return its index. If there is no such character, return -1. Hint you can use dictionary