Assignment No 1

Important Note:

- For all the questions, you have to use Visual Studio and upload all of the files of the solution. All questions should be done on a Console based application.
- Create separate solutions files for each question
- Every Question should be named as "k<Year><StudentID>_<QuestionNumber> for instance: k060195_Q1
- Your Assignment should have proper Objected Oriented Programming and Data Structures
- Last Date for Submission: **September 22, 2019 (11:55 PM)**

Question No 1: Data Types

List down all of the data types available in C# in a word document with the following details:

- Data Type Name
- Size in bits (if applicable)
- Range of values (if applicable)

Question No 2: Data Type Selection

An Electric company has developed a software to update the city-wise grid status in the central database per hour. Each city is divided into 24 areas or grid stations. After every hour, the software running at the city level, will verify the status of each grid station either if it is Active or In-Active.

Your task is to write a code which can store the statuses of each of the 24 grids by using least possible memory.

Note: An input file named "Q1Input.txt" will contain statuses of each grid in the following format:

G1,Active
G2,Inactive
.
.
.
G24,Active

Question No 3: Array Comparison

Write a program that compares the performance of the C# array, ArrayList and List<int>.

1. Generate 2M (two million) random values.

2. For each of the collections, find the sum of all of the elements and print the sum and the response time for the traversal.
3. Search 5 random values using Binary Search on ArrayList and List<int> and compare response timing.

Question No 4: DynamicList

Write a customized array by implementing the IList interface. In this question, you would not use the ArrayList or List collections.

- DynamicList would not allow inheritance.
- DynamicList would allow any type of data to be inserted into the list (string, int, etc), though only one can be used at one time.
- Implement all of the methods in IList.
- It would have a function named "DisplayAll" to display all elements present in the list.
- It would have a function "Find" which accepts one parameter and will return true if the value is found else false.

Question No 5: Write a program that compares the performance of the above DynamicList with C# array, ArrayList and List<int>.

a) Populate the collections by generating 2M (two million) random values
b) Carry out traversal and find the sum of the element values. Print the sum and the time required to carry out the traversal in each case.
c) Search five randomly chosen values from each of the collection by calling the IndexOf() function and compare response times.

Question No 6: Bubble Sort

You already know how bubble sort works by comparing adjacent elements. In this question you have to write a class library which has a class "Bubble Sort" with a function "Sort". Using pointers in C#, implement bubble sort which can sort array of any size. For simplicity purpose, the array will always be of integer data type.

Rules for Marking:

It should be clear that your assignment will not get any credit if:

- The Assignment is submitted after due date.
- The Submitted Assignment does not open or file is corrupted
- No assignment will be accepted through email unless slate is not working at the submission deadline.
- Copied amongst students or from another source