National University of Sciences and Technology (NUST)
School of Electrical Engineering and Computer Science

Subject: CS212 Object-Oriented Programming

Due Date: Sunday 9th May, 2021 (23:55 PM)

Instructions:

Please submit your own work as plagiarized work will yield zero marks.
Adhere to the deadline and follow submission instructions carefully to avoid penalties and deductions.
Apply good programming practices to your code based solutions to attain maximum credit.
Assignments will only be accepted via LMS. To avoid last minute delays, submit ahead of the deadline.

Assignment # 01 (20 Points) - Individual Assignment

[CLO1] - Understand the difference between procedural and Object Oriented Programming paradigms

Note: You will upload your submission on LMS through the appropriate submission link (a single MS word file). Late submissions/ submissions via email will not be accepted and will receive zero marks!

Question:

Compare and highlight the advantages of **object-oriented** programming paradigm over procedural programming paradigm with few examples / analogies (300 -500 words)?

Note: Please exclude the problem statement from your solution file. Moreover, name your solution file as follows:

<NAME_CMS-ID_ASSIGNMENT-1>.docx

Assignment # 02 (20 Points) - Individual Assignment

[CLO-2] Demonstrate the ability to create and use OOP constructs to map real world scenarios.

Note: You will upload your submissions on LMS through the appropriate submission links (a single MS word file and Solution.java file). Late submissions/ submissions via email will not be accepted and will receive zero marks!

Question:

(Set of Integers) Create a class **IntegerSet.** Each object of the class can hold integers in the range 0 through 100. A set is represented internally as an array of booleans. Array element **a[i]** is true if integer **i** is present in the set. Array element **a[i]** is false, otherwise. For example, for the set {6, 5} **a[6]** is true and **a[5]** is true; all other elements of **a** are false.

Provide the following methods:

- A no-argument constructor that initializes a set to the "empty" set (i.e., a set that has no integers in it).
- Method **insertElement** inserts a new integer **k** into a set (by setting **a[k]** to true).

For example, if **a** represents the set {0, 2, 4} then **method insertElement(3)** modifies **a** to represent the set {0, 2, 3, 4}.

- Method **deleteElement** deletes integer **m** (by setting **a[m]** to false).
- A static method **union** that creates a third set that is the union of the 2 existing sets (i.e., an element of the third set's array is set to true if that element is true in either, or both, of the existing sets; otherwise the element of the third set is set to false).
    - For example, if **a** represents the set {0, 2, 4} and **b** represents the set {2, 3, 4, 5} then **method union** represents the set as {0, 2, 3, 4, 5}.

- A static method **intersection** that creates a set which is the intersection of two existing sets (i.e., an element of the new set's array is set to false if that element is false in either or both of the existing sets—otherwise, the new set's element is set to true).
    - For example, if **a** represents the set {0, 2, 4} and **b** represents the set {2, 3, 4, 5} then **method intersection** represents the set as {2, 4}.

- A method **isEqualTo** determines whether two sets are equal.

- Write a program to **test** class **IntegerSet**. Instantiate several IntegerSet objects. Test that all your methods work properly.

Note: Please exclude the problem statement from your solution file. Moreover, name all your solution files as follows:

<NAME_CMS-ID_ASSIGN-2_>.**docx** and

<NAME_CMS-ID_ASSIGN-2_Code>.**java**