Langara College

# Department of Computing Science & Information Systems

# CPSC1150 – Program Design

###### **Lab9: Sorting and Lottery Game**

**Objectives:**

* Solving problems
* Using arrays
* Using method abstraction
* Creating and using data structures.
* Developing proper algorithms for real-life problems

**Instructions:**

1. Create a folder named **Lab9** to store all the files from this lab
2. Create an external documentation file (filename: **Lab9Ext.docx**) to store the summary, algorithm(s), and sample input and output for each problem.
3. All your programs must have good internal and external documentations
4. You must design algorithms for all the user-defined methods and the main method

**Problems [40 marks]**

**Problem 1: [15 marks] Bubble Sort** (filename: **TestBubbleSort.java**)

Write a sort method that uses the bubble-sort algorithm. The bubble-sort algorithm makes several passes through the array. On each pass, successive neighboring pairs are compared. If a pair is in decreasing order, its values are swapped; otherwise, the values remain unchanged. The technique is called a bubble sort or sinking sort because the smaller values gradually “bubble” their way to the top and the larger values sink to the bottom. The algorithm terminates when no swapping is made in a pass.

The pseudocode can be described as follows:

boolean changed = true;

do {

changed = false;

for (int j = 0; j < list.length – 1; j++)

if (list[j] > list[j + 1]) {

//swap list[j] with list[j + 1]

…..

changed = true;

}

} while (changed);

The method takes in an array of double values and returns void.

Write a program to test the method.

**Problem 2: [25 marks] Play Lottery** (filename: PlayLottery.java)

Design an algorithm and write a program that first asks a user to enter 6 distinct numbers between 1 and 49, then generates 6 distinct random numbers between 1 and 49, and then calculates and displays the total matched numbers between the two sets of numbers above.

You must create the following 3 methods for this program:

**getUserNumbers** (return an array of 6 distinct numbers between 1 and 49 entered by the user)

**getRandomNumbers** (return an array of 6 distinct random numbers between 1 and 49)

**getTotalMatchedNumbers** (return the total number of matched numbers. The parameters passed in are two arrays of integer numbers)

**What to hand in**

**Zip the folder** which contains the documentation file and all the Java source files from this lab and **submit the zipped folder to BrightSpace**.

**When to hand in**

By 10:29 am, Monday, Mar 22, 2021