LASALLE COLLEGE VANCOUVER

Assignment Foundation Review

VGP 131 - Object Oriented Programming in C++ II

April 2, 2022

ASSIGNMENT INSTRUCTION

- The assignment must be submitted by April 10, 2022.
- Each problem presents its own score, the sum of all scores is 100.

Student's Number:
Student's Name:

Problem 1. ***(25 Points)*** *A point in the x-y plane is represented by its x-coordinate and y-coordinate. Design a class, pointType, that can store and process a point in the x-y plane. You should then perform operations on the point, such as setting the coordinates of the point, printing the coordinates of the point, returning the x-coordinate, returning the y-coordinate, copy constructor and assignment operator. Also, write a program to test various operations on the point.*

Problem 2. ***(25 Points)*** *Every circle has a center and a radius. Given the radius, we can determine the circle's area and circumference. Given the center, we can determine its position in the x-y plane. The center of the circle is a point in the x-y plane. Design a class, circleType, that can store the radius and center of the circle. Because the center is a point in the x-y plane and you designed the class to capture the properties of a point in Programming Problem 1, you must derive the class circleType from the class pointType. You should be able to perform the usual operations on the circle, such as setting the radius, printing the radius, calculating and printing the area and circumference, carrying out the usual operations on the center, copy constructor and assignment operator. Also, write a program to test various operations on a circle.*

Problem 3. ***(25 Points)*** *What is the output of the following C++ code and is there a memory leak?*

```
int *p;
int *q;
p = new int;
q = new int;
*p = 27;
*q = 35;
cout << *p << "␣" << *q << endl;
```

```
q = p;
*q = 73;
cout << *p << "␣" << *q << endl;
p = new int;
*p = 36;
*q = 42;
cout << *p << "␣" << *q << endl;
```

Problem 4. ***(25 Points) end (+ 10 points in mid-term Exam)*** *(Adding Large Integers) In C++, the largest int value is 2147483647. So, an integer larger than this cannot be stored and processed as an integer. Similarly, if the sum or product of two positive integers is greater than 2147483647, the result will be incorrect. One way to store and manipulate large integers is to store each individual digit of the number in an array. Design a class named largeIntegers such that an object of this class can store an integer of any number of digits. Add operations to add, subtract, multiply, and compare integers stored in two objects. Also add constructors to properly initialize objects and functions to set, retrieve, and print the values of objects.*