CONFIDENTIAL

School of Computing
Faculty of Engineering, UTM

SKILL-BASED TEST 1

Semester I 2018/2019

SUBJECT CODE	**: SCSJ1023**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE II**
YEAR/PROGRAME	**: 1 & 2 (SCSB/SCSJ /SCSP/SCSR / SCSV)**
TIME	**: 2 p.m & 4 p.m (1 Hour 30 Minutes)**
DATE	**: 18 OCTOBER 2018**
VENUE	**: CGMTL, Level 2, Block N28, SC**

INSTRUCTIONS TO THE STUDENTS:

- This is a **CLOSED-BOOK** test. References to any resources by any means are strictly prohibited.
- This test consists of only **ONE** question.
- You must remain seated throughout the test session regardless of you finish early. You cannot leave until everyone has submitted.

MATERIAL FOR THE TEST:

- You are provided with a template source code file named **sbt1.cpp**.
- Download the material file (**sbt1.zip**) from **e-learning**. The file is a password-protected and will be disclosed later.
- Only the printed version is provided for the question script (**No PDF version**).
- The question script must be returned.

SUBMISSION PROCEDURE:

- You must stop doing the test once the time is up.
- Only the source code file is required for the submission, i.e. **sbt1.cpp**.
- You will do the submission by batch (2 to 4 students at a time).
- The submission must be done via the **e-learning** system.

Notes: You may use VS Code to answer this test. However, if the IDE in your PC is not working properly, switch to Dev C++.

Question

Write a complete C++ program that calculates the middle point from a list of points. A point is represented by its coordinates *x* and *y*. The middle point is expressed by the average of the coordinates *x* and *y* of the points, respectively. For example, if the points are **(1,2)**, **(2,4)** and **(3,3)**, then the middle point is calculated as:

$$\left(\frac{1+2+3}{3}, \frac{2+4+3}{3}\right) = (2, 3)$$

An incomplete class named `Point` has been provided in the program **sbt1.cpp** which declares all the private member variables (attributes) for the class.

1. Complete the class with the following public methods:
   a. A constructor (you may choose any type of constructor).
   b. All the necessary accessor methods.
   c. All the necessary mutator methods.
   d. An overloaded operator for the plus (+) operator, which is used for adding two points . For example, given two points ***p1*: (1, 2)** and ***p2*: (3, 3)**, thus ***p1 + p2*** results in a new point, **(3, 5)**
   e. An overloaded operator for the division (/) operator, which is used for performing a division operation between a point with a decimal number. For example, ***p1 / 2.0*** results in a new point, **(0.5, 1)** and ***p2 / 3.0*** results in **(1, 1)**

2. Complete the main function by taking into account the following requirements:
   a. The list of points are read from the user inputs and stored into an array.
   b. Your program must use the operators `+` and `/` of the class `Point` for the calculation of the middle point.
   c. Your program must print the output showing the coordinates *x* and *y* of all the points, including the middle point (Refer to Figure 1).

Notes:
You may add other methods to the class `Point` or other functions to the program if necessary.

```
How many points you want to enter => 4

Enter the coordinates (x and y) => 1  6
Enter the coordinates (x and y) => 2  7
Enter the coordinates (x and y) => 3  8
Enter the coordinates (x and y) => 4  9

Point           x       y
1               1       6
2               2       7
3               3       8
4               4       9

Middle Point    2.5     7.5
```

Figure 1: An example run of the program with user inputs (indicated by the bold texts) and the screen output.

Assessement

The test is assessed based on the criteria shown in Table 1 . Do check your program to ensure that it fulfills the criteria before submitting it.

Table 1: Assessment Criteria

Item	Criteria	Marks
A	The program can run with appropriate input and output.	2
	The code is neatly written including proper use of indentations and follow the naming convention.	1
B	**Class definition:**	
	The constructor	2
	Accessor Methods	4
	Mutator Methods	4
	The plus operator	3
	The division operator	3
C	**Main function:**	
	Using an array of objects	2
	Reading user inputs, i.e., a list of points	3
	Storing user inputs into the array	4
	Calculating the middle point	4
	Printing the output	3
	Total	**35**