SCHOOL OF COMPUTING
Faculty of Engineering

UNIVERSITI TEKNOLOGI MALAYSIA

TEST 2 – QUESTION 1 (DEBUGGING)

SEMESTER I 2021/2022

SUBJECT CODE	**: SECJ/SCSJ1013**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE I**
YEAR/COURSE	**: 1 (SECJ/ SECV/ SECB/ SECR/ SECP)**
TIME	**: 08:00 PM – 08:30 PM MYT (30 minutes)**
DATE	**: 11th JANUARY 2022 (Tuesday)**

INSTRUCTIONS TO THE STUDENTS:

- Please read the ***General Guidelines for the Programming Technique I Test 2*** that is shared in UTM e-learning
- Read the problem and instructions carefully
- You are given **30 (THIRTY) MINUTES** to complete the test inclusive of the submission of your program (**20 minutes to answer** the question and **10 minutes to submit** the answer).
- Your program must follow the input and output as required in the text and shown in the examples. You must test the programs with (but not limited to) all the input given in the examples.

IMPORTANT NOTES:

- All the **COMMENT STATEMENTS** in the submitted program **WILL NOT BE EVALUATED**.

SUBMISSION PROCEDURE:

- Only the source code is required for the submission (do not need to compress the file)
- File name format for **INTERIM** submission: **Test2Q1*_Name_matricsNo_section-interim*.cpp** (i.e., Test2Q1*_AinaAli_A20EC018_01-interim*.cpp)
- File name format for **FINAL** submission: **Test2Q1*_Name_ matricsNo_section-final*.cpp** (i.e., Test2Q1*_AinaAli_A20EC018_01-final*.cpp)
- Submit the source code file via the **UTM's e-Learning System**.

Question 1 [20 Marks]

You are given a C++ program (**`Test2Q1.cpp`**) with 10 errors (syntax errors and/ or logical errors, if any). The program is developed to calculate the total charge of car wash service based on car type and wash service package. It has five (5) user-defined functions as listed below:

Function Name	Description

`setType`	• Receives single string type parameter
	• Repeatedly ask the users to enter valid string input ("sedan" or "mpv")
	• Changes the value of the single parameter passed to it to set the type of car entered by the user
	• The car type parameter is used by the **`wash`**, **`vacuum`**, and **`polish`** functions to determine if an extra charge was required. For "mpv" type cars, an extra charge was applied as follows:
	  o wash and polish - 20% extra charge
	  o vacuum - 5% extra charge

`setPackage`	• Receives single integer type parameter
	• Repeatedly ask the user to enter valid integer values 1, 2, or 3 that respectively represent the basic, deluxe, or premium car wash service package
	• Changes the value of the single parameter passed to it to set the wash service package choose by the user
	• Inside the main function, the car wash service package determines the type of service as follows:
	  o Basic: wash
	  o Deluxe: wash + vacuum
	  o Premium: wash + vacuum + polish

`wash`	• Receives single string type parameter that is the type of car set by the **`setType`** function • Returns a float type value that is the charge for wash service (exterior body wash) based on the car type • Standard charge of wash service for "sedan" type car was determined through the definition of constant: **`#define WASH 10.0`**
`vacuum`	• Receives single string type parameter that is the type of car set by the **`setType`** function • Returns a float type value that is the charge for interior vacuum service based on the car type • Standard charge of vacuum service for "sedan" type car was determined through the definition of constant: **`#define VACUUM 7.0`**

polish	• Receives single string type parameter that is the type of car set by the **setType** function • Returns a float type value that is the charge for polish service based on the car type • Standard charge of polish service for "sedan" type car was determined through the definition of constant: **#define POLISH 15.0**

Study how all of the above functions were used/called inside the **main** function of the program. You are required to debug the errors, compile, and run the program. You are **NOT ALLOWED** to **remove** any statements in the program. You are only allowed to **update** the statements provided in the program and add a new statement(s) if absolutely necessary.

Figure 1 is the source code of the program and **Table 1** is the 5 (five) test cases that you can use to test the program to know if you have completely and correctly solved all the bugs.

```
 1  #include <iostream>
 2  #include <string>
 3  #include <cctype>
 4
 5  // standard car wash service charge for
 6  // "sedan" type car
 7  #define WASH 10.0
 8  #define VACUUM 7.0
 9  #define POLISH 15.0
10
11  using namespace std;
12
13  // function prototypes
14  void setType(string &);
15  void setPackage(int);
16
17  float wash(string);
18  float vacuum(string);
19  float polish(string);
20
21  // start main function
22  int main() {
23      // car type
24      string carType;
25
26      // car wash service package
27      int wsPkg;
28
29      // total service charge based on car type and
30      // wash service package
31      float totalCharge;
32
33      setType(carType);
34      setPackage(wspkg);
35
36      switch(wsPkg) {
37          case 3: totalCharge += polish(carType);
38          case 2: totalCharge += vacuum(carType); break;
39          case 1: totalCharge = wash(carType);
40      }
41
42      cout << endl;
43
44      cout << "Total service charge is " << totalCharge;
45      return 0;
46  }
47
48  // implement new user-defined functions
```

```
 49
 50  // function to set car type
 51  int setType(string &type) {
 52     // only exit the loop after user enter valid
 53     // car type that are "sedan" or "mpv"
 54     do {
 55          cout << "\nEnter car type (sedan/mpv): ";
 56          cin << type;
 57
 58     } while (type.compare("sedan") && type.compare("mpv"));
 59
 60     cout << endl;
 61  }
 62
 63  // function to set wash service package
 64  void setPackage(int pkg) {
 65     // only exit the loop after user enter valid
 66     // integer number 1, 2 or 3
 67     while (pkg >= 1 && pkg <= 3) {
 68          cout << "1. Basic\n";
 69          cout << "2. Deluxe\n";
 70          cout << "3. Premium\n";
 71          cout << "Choose wash service package (1/2/3): ";
 72          cin >> pkg;
 73     }
 74
 75     cout << endl;
 76  }
 77
 78  // Function to determine exterior wash service charge based
 79  // on car type. The "mpv" type car will be charged 20% higher.
 80  float wash(string type) {
 81     float charge;
 82
 83     if (!type.compare("mpv"))
 84        charge = WASH + WASH * 20 / 100;
 85     else
 86        charge = WASH;
 87
 88     cout << "Wash service charge is " << charge << endl;
 89
 90     return charge;
 91  }
 92
 93  // Function to determine interrior vacuum service charge based
 94  // on car type. The "mpv" type car will be charged 5% higher.
 95  float vacuum(string type) {
 96     float charge;
 97
 98     if (type.compare("mpv")) {
 99         charge = VACUUM + VACUUM * 5 / 100;
100
101     } else {
102         charge = WASH;
103     }
104
105
106     cout << "Vacuum service charge is " << charge << endl;
107
108     return charge;
109  }
110
111  // Function to determine exterior polish service charge based
112  // on car type. The "mpv" type car will be charged 20% higher.
113  float polish(string type) {
114     float charge;
115
116     if (!type.compare("mpv"))
117        charge = POLISH + POLISH * 20 / 100;
118     else
119        charge = POLISH;
120
```

```
121     cout << "Polish service charge is " << charge << endl;
122
123     return charge;
124 }
```

Figure 1: Source code of the program

Table 1: Test cases to run and test the program (user inputs are shown in **red-bold** text)

TEST CASE 1

```
Enter car type (sedan/mpv): suv

Enter car type (sedan/mpv): sedan

1. Basic
2. Deluxe
3. Premium
Choose wash service package (1/2/3): 0
1. Basic
2. Deluxe
3. Premium
Choose wash service package (1/2/3): 4
1. Basic
2. Deluxe
3. Premium
Choose wash service package (1/2/3): 1

Wash service charge is 10

Total service charge is 10
```

TEST CASE 2

```
Enter car type (sedan/mpv): sedan

1. Basic
2. Deluxe
3. Premium
Choose wash service package (1/2/3): 2

Vacuum service charge is 7
Wash service charge is 10

Total service charge is 17
```

TEST CASE 3

```
Enter car type (sedan/mpv): mpv

1. Basic
2. Deluxe
3. Premium
Choose wash service package (1/2/3): 2

Vacuum service charge is 7.35
Wash service charge is 12

Total service charge is 19.35
```

TEST CASE 4

```
Enter car type (sedan/mpv): sedan

1. Basic
2. Deluxe
3. Premium
Choose wash service package (1/2/3): 3

Polish service charge is 15
Vacuum service charge is 7
Wash service charge is 10

Total service charge is 32
```

TEST CASE 5

```
Enter car type (sedan/mpv): mpv

1. Basic
2. Deluxe
3. Premium
Choose wash service package (1/2/3): 3

Polish service charge is 18
Vacuum service charge is 7.35
Wash service charge is 12

Total service charge is 37.35
```