CONFIDENTIAL

SCHOOL OF COMPUTING
Faculty of Engineering

UNIVERSITI TEKNOLOGI MALAYSIA

TEST 2 (WRITTEN)

SEMESTER I 2018/ 2019

SUBJECT CODE	**: SCSJ 1013**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE I**
YEAR/COURSE	**: 1 (SCSJ / SCSV / SCSB / SCSR /SCSP)**
TIME	**: 2.30PM-4.00PM (1 HOUR AND 30 MINUTES)**
DATE	**: 30th OCTOBER 2018 (TUESDAY)**
VENUE	**: BK1 – BK7, N28**

INSTRUCTIONS TO THE STUDENTS:

This test book consists of 9 questions.

Please answer all questions in the answer booklet.

ANSWER ALL QUESTIONS IN THIS BOOKLET IN THE SPACES PROVIDED.

Name	
Matric No.	
Section	
Lecturer's Name	

This question booklet consists of **12 pages** inclusive of the cover page.

QUESTION 1 **[6 MARKS]**

Determine the output for the program segment given in Table 1. Write your output with decimal points if applicable in **Output** column in Table 1.

Table 1

Line		Output
1	`int a = 3, b, c = -3, d;`	
2	`float e, f = 2.5;`	
3	`b = a * -c;`	
4	`d = a++ / 2 + c;`	
5	`c += a + b % 2;`	
6	`f = 4.0 * d / 6;`	
7	`e = static_cast<float>(3 * a) + f;`	
10		
11	`cout << "a = " << a << endl;`	_____
12	`cout << "b = " << b << endl;`	_____
13	`cout << "c = " << c << endl;`	_____
14	`cout << "d = " << d << endl;`	_____
15	`cout << "e = " << e << endl;`	_____
16	`cout << "f = " << f << endl;`	_____

QUESTION 2 **[6 MARKS]**

Program 1 below is meant to ask the user to enter a radius of sphere **r** and display the volume **V** of sphere. The volume of sphere is expressed by the following formula:

$$V = \frac{4}{3}\pi r^3$$

Complete **Program 1**, based on the instructions or comments written in (a) to (e).

Line	Program 1
1	`#include <iostream>`
2	
3	`using namespace std;`
4	`int main()`
5	`{`
6	`// (a) Declare v and r as variables for volume and radius` `//  in floating point data type`
7	`_____;`
8	`// (b) Declare a constant variable for PI = 3.1415926`
9	`_____;`
10	`// Display a corresponding prompt to the user`
11	`cout << "Enter the radius of sphere:";`
12	`// (c) Input radius, r`
13	`_____;`
14	
15	`// (d) Calculate the volume of sphere.`
16	`_____;`
17	
18	`// (e) Display the volume of sphere.`
19	`_____;`
20	`return 0;`
21	`}`

QUESTION 3 **[5 MARKS]**

Determine the output for code segment below:

```
1  int x = 3, y = 5;
2  char code = 'A', code2 = 'S';
3  bool p = false;
4  bool q;
5
6  cout << ((x + 3) > (y + 5)) << endl;
7  cout << (((p != 0) + 10) && ((p + 10) == 10)) << endl;
8  cout << ((code == 'C') || (code2 != 'S')) << endl;
9  q = x - y;
10 x = q + 1;
11 cout <<"The value of q is " << q <<endl;
12 cout <<"The value of x is " << x <<endl;
```

Answer:

QUESTION 4 **[7 MARKS]**

The following code segment is meant to determine the price of a pineapple based on its grade. Convert the **`if-else`** statement (lines 8 – 16) using the **`switch`** statement.

```
1  char grade;
2  double price;
3
4  cout << "Our pineapple has three grades:\n ";
5  cout << "A, B, and C. Which do you want pricing for? ";
6  cin >> grade;
7
8  if (grade == 'A' || grade == 'a')
9    price = 50.00;
10 else if (grade == 'B' || grade == 'b')
11   price = 30.00;
12 else if (grade == 'C' || grade == 'c')
13   price = 15.00;
14 else
15   cout << "Invalid grade.";
16 //end for if
17 cout << grade << " grade pineapple is RM" << price
18      << "per kilogram.\n ";
```

Answer:

QUESTION 5 **[12 MARKS]**

Table 2 shows the rate of telephone calls for a telecommunication company.

Table 2 : Call charges rate

Starting Call Time	Calling Rate (RM per Minute)
00:00 – 06:59	0.12
07:00 – 19:00	0.55
19:01 – 23:59	0.35

The program input for call time is a floating-point number in the form of `HH.MM`. For example:

`07:00` hours should be entered as `07.00`
`16:28` hours should be entered as `16.28`

Assume that the code for getting user inputs has been taken care in the program. Also, the related variables have been declared as follow:

```
float call;          // call time
float rate;          // rate (RM per minute)
float minute;        // minute
```

i. Based on the **Table 2** information, write the C++ code segment that implements the process to determine the calling rate. **(6 marks)**

Answer:

ii. Write the code segment that implements input validation so that the program should not accept times that are greater than 23:59. **(2 marks)**

For example;

Input (Call):

```
25.35
```

Output:

```
Your call time is invalid
```

Answer:

iii. Write the code segment that implements input validation so that the program should not accept input whose last two digits are greater than 59. **(4 marks)**

Notes:

-Apply type casting to split the call input into **hour** and **minutes**.
-The formula to calculate minutes:

minutes = (call - hour) * 100

For example;

Input (Call):

```
23.75
```

Output:

```
You must enter minute less than 59
```

Answer:

QUESTION 6 **[8 MARKS]**

Given a program in **Figure 1**. Fill in the blanks in **Table 3**, if the user input is as follows:

95 35 -1 70 65

```
#include <iostream>
using namespace std;

int main()
{
   int mark = 0, tolMark = 0, testNo = 0;
   float average = 0.0;

   do
   {
      cout << "Enter mark: ";
      cin >> mark;

     if ((mark < 0) || (mark > 100))
         cout << "Invalid input" << endl;
     else
     {
         tolMark += mark;
         testNo++;
     }
   } while (testNo < 4);

   average = static_cast<float>(tolMark) / testNo;
   cout << "Average: " << average;

   return 0;
}
```

Figure 1

Answer:

Table 3

mark	tolMark	testNo	average	output
95				
35				
-1				
70				
65				
-				

QUESTION 7 **[5 MARKS]**

Given a flowchart in **Figure 2**. Write the code segment using a pre-test loop.

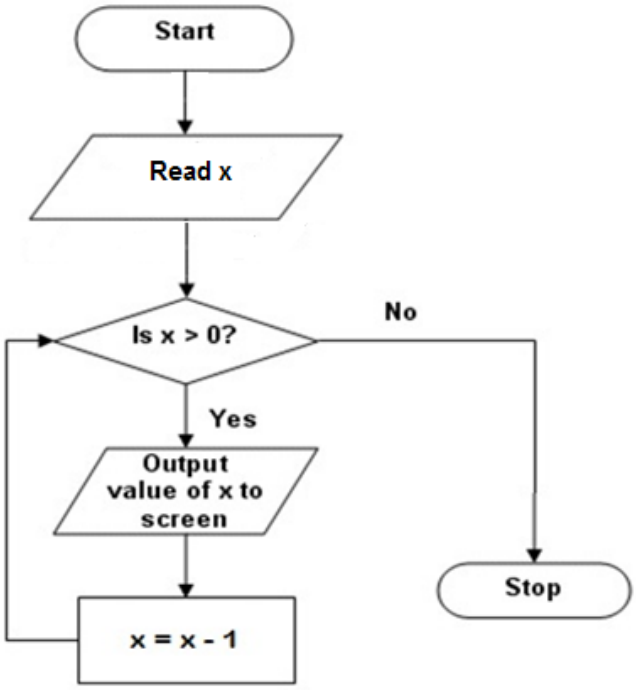

Figure 2

Answer:

QUESTION 8 **[8 MARKS]**

Pythagoras' Theorem describes the mathematical relationship between three sides of a right-angled triangle. **Figure 3** shows a triangle has the values of x = 12.5 and theta (θ) = 54°. Based on the given values, calculate the value of hypotenuse (z) and adjacent (y) using trigonometric ratios formula and Pythagoras' Theorem $x^2 + y^2 = z^2$. Complete the blank spaces with appropriate predefined functions based on the output generated in **Output** column in **Table 5**.

Note: **Table 4** shows a list of predefined functions and trigonometric ratios formula as a guide.

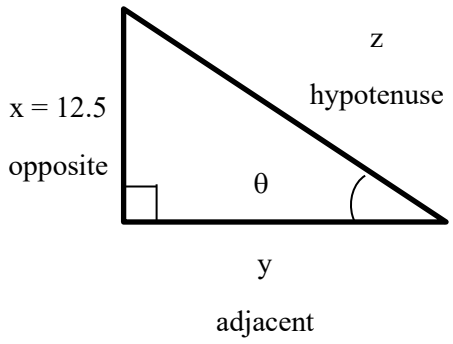

Figure 3

Table 4

Predefined functions			
pow (x, y)	tan (x)	sin (x)	cos (x)
sqrt (x)	ceil (x)	floor (x)	fabs (x)
abs (x)	exp (x)	log (x)	log10 (x)
Trigonometric ratio formula			
$\sin\theta = \frac{opposite\ (x)}{hypotenuse\ (z)}$	$\cos\theta = \frac{adjacent\ (y)}{hypotenuse\ (z)}$	$\tan\theta = \frac{opposite\ (x)}{adjacent\ (y)}$	

Table 5

Line	C++ Statement	Output
1	`#include <iostream>`	
2	`#include <cmath>`	
3		
4	`using namespace std;`	
5		
6	`int main() {`	
7		
8	`int a;`	
9	`double theta = 54.0;`	
10	`double rads = 0, x = 12.5, y, z;`	
11		

12	`//convert degree to radians`	
13	`rads = theta * 3.14159 / 180;`	
14		
15	`//calculate hypotenuse using trigonometric`	
16	`//ratios formula`	
17	`z = x / _____;`	
18	`cout << "hypotenuse=" << z <<endl;`	`15.4509`
19	`cout << _____ << endl;`	`15`
20		
21	`//calculate adjacent using Pythagoras' Theorem`	
22	`y = _____;`	
23	`cout << "adjacent=" << y << endl;`	`9.0818`
24	`a = _____;`	
25	`cout << a << endl;`	`10`
26	`cout << _____ << endl;`	`1`
27		
28	`return 0;`	
29	`}`	

QUESTION 9 **[8 MARKS]**

Write the main function of a program that use appropriate library functions for working with C-Strings and follows below requirements sequentially:

i) Firstly, the program should compare the two strings (`state` and `country`). If the strings compared are not same, it displays "`The strings are NOT same.`", meanwhile if the strings compared are same, it displays "`The strings are same.`".

ii) Secondly, the program should display the concatenation of the two strings (`state` and `state2`).

iii) Thirdly, the program should determine the length of the string stored in the updated `state` array.

iv) Lastly, the program should copy one string (`country`) to another string (`state`). The output from a sample run is given below.

```
String are not same.
The concatenation is JohorBahru
The size is 10
The copy of the two strings is Malaysia
```

Answer:

```
#include <iostream>
#include <cstring>
using namespace std;


int main()

{
   int length;
   char state[20] = "Johor";
   char state2[10] = "Bahru";
   char country[10] = "Malaysia";









   return 0;
}
```