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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017**

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COURSE NAME : COMPUTER PROGRAMMING I
COURSE CODE : BWA 10103
PROGRAMME CODE : BWA
EXAMINATION DATE : DECEMBER 2016 / JANUARY 2017
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

LEE SIOW CHONG
Penyair
Fakulti Sains, Teknologi dan Pendidikan
Universiti Tun Hussein Onn Malaysia

THIS QUESTION PAPER CONSISTS OF **TWELVE (12)** PAGES

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PART A

In Questions 1-10, only **ONE (1)** of the choices given (a), (b), (c) and (d) contain the correct answer. Write the correct choice in the answer sheet provided. Each question carries 2 marks.

Q1 Which of the following statement is **true**?

- (a) All variables must be declared before they are used.
- (b) Comments cause the computer to print the text after the // on the screen when the program is executed.
- (c) A compiler translates an assembly language code into a machine language code.
- (d) The modulus operator (%) can be used with float or double operands.

(2 marks)

Q2 What is the output of the following program segment?

```
int a = 1, b = 4, c;  
cout << a++ + b++;  
c = --a + --b*2;  
b+= a;  
cout << a << b << c;
```

- (a) 7159
- (b) 5101110
- (c) 7101110
- (d) 5159

(2 marks)

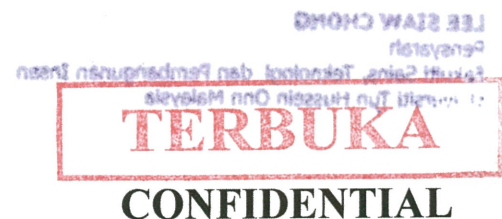
Q3 A function func returns a double result and has three input arguments:

- (i) the first argument has the type int and is passed by value.
- (ii) the second argument is an array of type float and is passed by reference.
- (iii) the third argument has the type int with default value 1 and is passed by value.

Which of the following function prototype correctly declares func?

- (a) void func(int, float [], int c = 1);
- (b) double func(int, float [], int c = 1);
- (c) double func(int a, float b[], int c);
- (d) double func(int a, float b, int c = 1);

(2 marks)



Q4 Which of the program segment (a)-(d) produces the following output?

```

      *
     *
    *
   *
  *
 *

```

- (a)

```

for ( int i = 1; i <= 7; i++ )
{
    for( int j = 1; j <= 7; j++ )
        if ( i + j == 7 )
            cout << "*" ;
        else
            cout << " " ;
    cout << endl;
}

```
- (b)

```

for ( int i = 1; i <= 7; i++ )
{
    for( int j = 1; j <= 7; j++ )
        cout << ( ( i + j == 8 ) ? "*" : " " );
    cout << endl;
}

```
- (c)

```

int i = 1;
while( i < 8 )
{
    for (int j = 1; j <= 7; j++ )
        if ( i + j == 8 )
            cout << "*" ;
        else
            cout << " " ;
    i++;
}

```
- (d)

```

int i = 1;
do{
    for ( int j = 1; j <= 7; j++ )
        if ( i + j == 8 )
        {
            cout << "*" ; cout << endl;
        }
        else
            cout << " " ;
    i++;
}while( i < 8 );

```

LEE SIANG CHONG
 Penyerah
 Fakulti Sains, Teknologi dan Pengiraan
 Universiti Tun Hussein Onn Malaysia

(2 marks)

Q5 Consider the program segment (i) - (iv).

- (i)

```
counter = 3;
while ( counter > 0 )
{
    i = i + j;
    i++; j++; counter--;
    cout << i << j;
}
```
- (ii)

```
i = 0; j = 0; counter = 3;
do{
    i = i + j;
    i++; j++; counter--;
    cout << i << j;
}while( counter > 0 );
```
- (iii)

```
i = 0; j = 0;
for( counter = 3; counter >= 0; counter-- )
{
    i = i + j;
    i++; j++;
    cout << i << j;
}
```
- (iv)

```
i = 1;
switch(i)
{
    case 1:
        cout<<"11";
    case 2:
        cout<<"32";
    case 3:
        cout<<"63";
}
```

Which program segment produces the following output?

113263

Assume that all variables are declared as int.

- (a) (i) and (iv) only.
- (b) (i) and (ii) only.
- (c) (i), (ii) and (iii) only.
- (d) (i), (ii) and (iv) only.

LEE SIAW CHONG
 Professor
 Fakulti Sains, Teknologi dan Perkomputeran
 Universiti Tun Hussein Onn Malaysia
 (2 marks)

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Q6 What is stored in `mylist` after the following C++ code executes?

```
int list[ 8 ];
list[ 0 ] = 1;
list[ 1 ] = 2;
for ( int i = 2; i < 8; i++ )
{
    list[ i ] = list[ i - 1 ] * list[ i - 2 ];
    if ( i > 5 )
        list[ i ] = list[ i - 1 ] - list[ i - 2 ];
}
```

- (a) 1 2 2 4 8 32 24 -8
- (b) 1 2 2 4 8 32 256 224
- (c) 1 2 2 4 8 24 16 8
- (d) 1 2 2 4 8 4 -4 -8

(2 marks)

Q7 What is the output of the following program?

```
#include<iostream>
using namespace std;
int main()
{
    int x, y;
    int *p = &x;
    int *q = &y;
    x = 62; y = 38;
    q = p;
    *p = 55; x = *q;
    cout << x << " " << y << endl;
    cout << *p << " " << *q << endl;
}
```

- (a) 62 38
55 55
- (b) 55 38
55 55
- (c) 55 38
55 38
- (d) 62 38
55 38

(2 marks)

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Q8 What is the output of the following code?

```
#include <iostream>
using namespace std;
int main()
{
    const int arraysize = 4;
    int list[ arraysize ] = {10,8,15,22};
    int *ptr = list;
    *ptr = *ptr + 2;
    cout << "*ptr = " << *ptr << endl;
    cout << "*(ptr + 1) = " << *( ptr + 1 ) << endl;
    ptr++;
    cout << "*ptr = " << *ptr << endl;
    cout << "*(ptr + 2) = " << *( ptr + 2 ) << endl;
    *ptr = 2 * (*ptr) - 3;
    cout << "*ptr = " << *ptr << endl;
}
```

(a) *ptr = 10
*(ptr + 1) = 8
*ptr = 12
*(ptr + 2) = 22
*ptr = 13

(b) *ptr = 12
*(ptr + 1) = 8
*ptr = 8
*(ptr + 2) = 22
*ptr = 13

(c) *ptr = 10
*(ptr + 1) = 8
*ptr = 8
*(ptr + 2) = 22
*ptr = 13

(d) *ptr = 12
*(ptr + 1) = 15
*ptr = 8
*(ptr + 2) = 22
*ptr = 8

(2 marks)

Q9 Assume the following declarations and statements exist.

```
int *zptr;
int number;
int z[5] = {8,2,3,4,5};
```

Which of the following C++ expression **do not** contain any error?

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PART B

Answer **all** questions in the answer sheet provided.

- Q11 (a)** Write a program that converts centimeters to inches, feet, yards or miles. First, prompt the user to enter their choice: 1 for inches, 2 for feet, 3 for yards and 4 for miles. Then ask the user to input length x , in cm. Use the `switch` selection structure to do the conversion based on the user's choice. Finally output the computed result. Your program should have the following output if the input choice is 2, $x = 2.43$:

```

**This program converts cm to inches, feet, yards and
miles**
1 for inches.
2 for feet.
3 for yards.
4 for miles.
Enter your choice : 2
x = 2.43
2.43cm = 0.079704 feet.
    
```

Refer to **Table Q11(a)** for the conversion constants.

Table Q11(a): Conversion from 1 cm to inches, feet, yards and miles

inches	feet	yards	miles
3.94×10^{-1}	3.28×10^{-2}	1.09×10^{-2}	6.21×10^{-6}

In addition, add one default case in your switch statements so that the program displays "Invalid case" if the user input the choice with numbers other than 1, 2, 3 or 4.

(12 marks)

- (b) The value of π can be approximated using the following series:

$$\pi = 4 \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots + \frac{1}{2n-1} - \frac{1}{2n+1} \right).$$

The following program uses this series to find the approximate value of π . However, the statements are in the incorrect order and there is a logic error in this program. Rearrange the statements and remove the bug so that this program can be used to approximate π .

```

#include <iostream>
using namespace std;

int main()
{
    double pi = 0;
    long i, n;
    cin >> n;
    cout << "Enter the value of n : ";
    cout << endl;
    
```

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```

    if ( i % 2 == 0)
        pi = pi + ( 1 + 1 / ( 2 * i + 1 ) );
    else
        pi = pi - ( 1 + 1 / ( 2 * i + 1 ) );

    for ( i = 0; i < n; i++ )
    {
        pi = 0;
        pi = 4 * pi;
    }
    cout << "pi = " << pi << endl;
}

```

(8 marks)

Q12 (a) What is the output of the following code?

```

#include <iostream>
using namespace std;
int x = 3;
void StaticLocal();
void PassbyReference(int &);

int main()
{
    cout << "x in main is " << x << endl;

    {
        int x = 5, y = 7;
        cout << "local x entering main's inner scope is "
        << x << endl;
        x += y;
        cout << "local x exiting main's inner scope is " <<
        x << endl;
    }
    cout << "x in main is " << x << endl << endl;

    StaticLocal();
    PassbyReference( x );

    cout << endl;
    cout << "x in main is " << x << endl << endl;
    StaticLocal();
    PassbyReference( x );

    cout << endl;
    cout << "x in main is " << x << endl << endl;
}

```

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```

void StaticLocal()
{
    static int x = 10;
    cout << "Local x is " << x << " on entering
    StaticLocal" << endl;
    --x;
    cout << "Local x is " << x << " on exiting
    StaticLocal" << endl;
}

void PassbyReference( int &x )
{
    cout << "x on entering PassByReference is "
    << x << endl;
    x++;
    cout << "x on exiting PassByReference is "
    << x << endl;
}

```

(14 marks)

- (b) Write a recursive function, `power`, that takes as parameters two integers x and y such that x is nonzero and returns x^y . You can use the following recursive definition to calculate x^y :

If $y \geq 0$,

$$\text{power}(x, y) = \begin{cases} 1 & \text{if } y = 0, \\ x & \text{if } y = 1, \\ x \times \text{power}(x, y-1) & \text{if } y > 1. \end{cases}$$

If $y < 0$,

$$\text{power}(x, y) = \frac{1}{\text{power}(x, -y)}.$$

Make sure you use the correct return and argument type. **Do not** use the C++ math library function `power`. What is the function prototype for `power`?

(6 marks)

LEE SIANG CHONG
 Pensyarah
 Fakulti Sains, Teknologi dan Pengiraan
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Q13 (a) What is the expected output of the following C++ code?

```
#include <iostream>
using namespace std;
int main()
{
    int list1[ 5 ] = {}; int list2[ 15 ] = {};
    for ( int i = 0; i < 5; i++ )
        list1[ i ] = i*i - 2;
    cout << "list1: " << endl;

    for ( int i = 0; i < 5; i++ )
        cout << list1[i] << " ";
    cout << endl;

    for ( int i = 0; i < 5; i++ )
    {
        list2[ i ] = list1[ i ] * i;
        list2[ i + 5 ] = list1[ 4 - i ] + i;
        list2[ i + 10 ] = list2[ 9 - i ] + list2[ i ];
    }

    cout << "list2: " << endl;
    for ( int i = 0; i < 15; i++ )
    {
        cout << list2[ i ] << " ";
        if ( i == 4 || i == 9 )
            cout << endl;
    }
}
```

(8 marks)

(b) Write a program that allows the user to enter the last names of five candidates in a local election and the number of votes received by each candidate. The program should then output each candidate's name, the number of votes received, and the percentage of the total votes received by each candidate. Your program should also output the winner of the election. A sample output is:

Candidate	Votes Received	% of total votes
Johnson	5000	25.91
Miller	4000	20.73
Duffy	6000	31.09
Robinson	2500	12.95
Ashton	1800	9.33
Total	19300	

The Winner of the Election is Duffy.

(12 marks)

- Q14 (a)** Recently, Alice, Bob, Charlie and David took a C++ exam and obtain the score of 89, 75, 64 and 100 respectively. The following code declares a string array `arraynames` that represent the candidates' name and an integer array `grades` that represents their score.

```
string arraynames[]={"Alice","Bob","Charlie","David"};
int grades[]={89,75,64,100};
```

Complete the code so that a text file `Grades.txt` is created with the following text written in it.

```
Alice      89
Bob        75
Charlie    64
David     100
```

Make sure that your program have the following features:

- (i) Displays the message "File could not be opened" if the file `Grades.txt` cannot be created. (2 marks)
 - (ii) The output written on the file `Grades.txt` has names left justified and score right justified. Make sure you set enough horizontal space width for each data. (6 marks)
- (b) From the file `Grades.txt` created in Q5(a), write a **new** program that appends the following two additional lines

```
Eric      55
Francis   62
```

Close `Grades.txt` after append. Then reopen it to read its content and store the name in a string array, say `names` and the score in a integer array, say `scores`. Use the array to compute the average of the six candidates. Then append the output (average) back in `Grades.txt`. In other words `Grades.txt` should have the following text written in it:

```
Alice      89
Bob        75
Charlie    64
David     100
Eric      55
Francis   62
```

The average of the 6 candidates is 74.1667

(12 marks)

-END OF QUESTIONS -

