



UNIVERSITY OF COLOMBO, SRI LANKA

0201

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Academic Year 2015/2016 – First Year Examination – Semester 2 – 2016

SCS1109 – Programming II

TWO (2) HOURS

To be completed by the candidate

Examination Index No: _____

Important Instructions to candidates:

1. The medium of instruction and questions is **English**.
2. If a page or a part of this question paper is not printed, please inform the supervisor immediately.
3. Note that questions appear on both sides of the paper. If a page is not printed, please inform the supervisor immediately.
4. Write your index number in each and every page of the question paper.
5. This paper has **4** questions and **14** pages.
6. Answer **ALL** questions. All questions carry equal marks (**25** marks).
7. Any electronic device capable of storing and retrieving text including electronic dictionaries and mobile phones are not allowed.
8. Non-programmable calculators are allowed.

For Examiner's use only

Question No	Marks
1	
2	
3	
4	
Total	

1. (a) What does the following program do?

[07 Marks]

```
# include <stdio.h>

long int myfunction( int, int );

int main( )
{
    int x, y;
    printf( "Enter two integers: " );
    scanf( "%d%d" , &x, &y );
    printf( "The result is = %ld \n" , myfunction( x, y ) );
    return 0;
}

long int myfunction( int a, int b )
{
    if ( b == 1 )
        return a;
    else
        return a * myfunction( a, b - 1 );
}
```

Note: The second argument (parameter **b**) of **myfunction** must be a **positive integer** to prevent infinite recursion.

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(b) First determine what the program of above (a) does, then modify the function `myfunction` properly after removing the restriction of the second argument (parameter `b`) being **positive integer** to **greater than or equal to zero**.

[08 Marks]

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(c) Modify the above (b) function `myfunction` properly after removing the restriction of the second argument (parameter `b`) being **greater than or equal to zero** to **signed integer**.

[10 Marks]

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2. (a) What does the following program do?

[07 Marks]

```
# include <stdio.h>

int mysterycmp( char [], char [] );

int main( )
{
    char string1[80], string2[80];
    printf( "Enter two strings: " );
    scanf( "%s%s", string1, string2 );
    printf( "The result is = %d \n", mysterycmp( string1, string2 ) );
    return 0;
}

int mysterycmp( char s1[], char s2[] )
{
    for ( int i = 0, j = 0 ; s1[i] != '\0' && s2[j] != '\0' ; i++, j++ )
        if ( s1[i] != s2[j] )
            return 1;

    return 0;
}
```

(b) First determine what the program of above (a) does, then modify the function **mysterycmp** properly to compare two strings input by the user. The program should state whether the first string is less than, equal or greater than the second string.

[08 Marks]

3. (a) Write a program to read all the command line argument numbers as a set **command line arguments** separated by spaces and print out the value obtained by adding all of them together.

[10 Marks]

All numbers will be integers (whole numbers) between 0 and 100.

Sample Input

yourprogram 10 15 20 25 50

Output

120

(b) Write a program to read a series of words from the input (command line arguments) and then perform the following on them.

[15 Marks]

- For each character in the word, print the character and the corresponding position in the English alphabet separated by a dash (-).
- For each word, print the word and the sum of the character indexes of all the characters in the word separated by a dash (-).

Note: Make sure to print out the letter in **Capitals**. All numbers in the character indexes will be integers (whole numbers) between 1 and 26.

Sample Input

yourprogram AVRIL TAYLOR MILEY

Output

A-1
V-22
R-18
I-9
L-12
AVRIL-62
T-20
A-1
Y-25
L-12
O-15
R-18
TAYLOR-91
M-13
I-9
L-12
E-5
Y-25
MILEY-64

4. (a) Consider the following declaration of the Shape class and write a C++ program to satisfy the given requirements.

```
class Shape
{
    protected:
        float width, height;
    public:
        void set_data (float a, float b)
        {
            width = a; height = b;
        }
};
```

Requirements:

- (i). Add a constructor to shape class that provides value to width and height.
- (ii). The define two sub-classes Triangle and Rectangle, that have *private* behaviors to calculate and return the area of the shape.
Area of a Triangle = $\frac{1}{2} \times \text{width} \times \text{height}$
Area of a Rectangle = $\text{width} \times \text{height}$
- (iii). Add public behaviors to display the area of the Triangle and Rectangle.
- (iv). Write a main() function to define and set two variables of a triangle and a rectangle and then display their areas

[13 Marks]

[illegible]

[illegible]

```
(i). #include<iostream>
using namespace std;
```

```
class Vehicle
{
    public :
        Vehicle(){cout<<"In Vehicle constructor"<<endl;}
        void display(){cout<<"members of Vehicle\n";}
};

class HeavyVehicle : public Vehicle
{
    public:
        HeavyVehicle(){cout<<"In HeavyVehicle constructor"<<endl;}
        void display(){cout<<"members of HeavyVehicle\n";}
};

class Bus : public HeavyVehicle
{
    public :
        Bus(){cout<<"In Bus constructor"<<endl;}
        void display(){cout<<"members of Bus\n";}
};
```

[04 Marks]

```
class number
{
    int num;
    public :
        number(){num=1000;}
        number(int x){num=x;}
        int getnumber(){return(num);}
        int magic()
        {
            int i,j,k,m,x,y;
            for (i=1;i<=9;i++)
            for (j=0;j<=9;j++)
            for (k=0;k<=9;k++)
```

```

        for (m=0;m<=9;m++)
        {
            x=i*1000+j*100+k*10+m;
            y=m*1000+k*100+j*10+i;
            if (y==(x*9))
                return x;
        }
        return (0);
    }
};

int main()
{
    class number n1,n2(1069),n3(1098);
    int x,y;
    y=n1.magic();
    cin>>x;
    if (n1.getnumber()==y) cout<<"Correct"<<n1.getnumber(); else
        cout<<"Wrong"<<n1.getnumber()<<endl;
    if (n2.getnumber()==y) cout<<"Correct"<<n2.getnumber(); else
        cout<<"Wrong"<<n2.getnumber()<<endl;
    if (n3.getnumber()==y) cout<<"Correct"<<n3.getnumber(); else
        cout<<"Wrong"<<n3.getnumber()<<endl;
    if (x==y) cout<<"Correct"<<x; else
        cout<<"Wrong"<<endl;
    return (0);
}

```

[04 Marks]

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(iii). #include <iostream>
using namespace std;

```
class alpha
{
    int data;
public :
    alpha() {}
    alpha(int d) {data=d;}
    void display()
        { std::cout<<data; }
    alpha & operator=(alpha& a)
    {
        data=a.data;
        std::cout<<"\n Assignment operator invoked";
        return *this;
    }
};

int main()
{
    alpha a1(37), a2, a3;
    a3=a2=a1;
    std::cout<< "\n a2="; a2.display();
    std::cout<< "\n a3="; a3.display();
}
```

[04 Marks]

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