

Chapter 7: User-Defined Functions II

Extra Programming Examples

Laboratory Exercises (3)

Part 1: An Example of Value Parameters

A Program that illustrates how a value parameter works.

```
#include<iostream>

using namespace std;

void funcValueParam(int num);

int main()
{
    int number = 6;

    cout << "Line 2: Before calling the function " << "funcValueParam,
    number = " << number << endl;

    funcValueParam(number);

    cout << "Line 4: After calling the function " << "funcValueParam,
    number = " << number << endl; return 0;
}

void funcValueParam(int num)
{
    cout << "Line 5: In the function funcValueParam, " << "before
    changing, num = " << num << endl;

    num = 15;

    cout << "Line 7: In the function funcValueParam, "<< "after changing,
    num = " << num << endl;
}
```

Part 2: Examples of Reference Parameters

Example 1: A Program that illustrates how a reference parameter works. This program calculates the factorial of a number.

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

void getNumber(int &num)
{
    cout<<"Enter a number: "<<endl;
    cin>>num;
}

void calculateFactorial(int n)
{
    int i, fact = 1;
    for (i=1; i<=n; i++)
    {
        fact = fact * i;
    }
    cout<<"The factorial of "<<n<<" is: "<<fact;
}

int main()
{
    int a;
    getNumber(a);
    calculateFactorial(a);
    return 0;
}
```

Example 2: A Program that illustrates how a reference parameter works. This program swaps two numbers using call by reference

```
#include <iostream>

using namespace std;

void swapNums(int &x, int &y)
{
    int z = x;
    x = y;
    y = z;
}

int main()
{
    int firstNum = 10;
    int secondNum = 20;

    cout << "Before swap: " << "\n";
    cout << firstNum << secondNum << "\n";

    // Call the function. will change the values of firstNum and secondNum
    swapNums(firstNum, secondNum);

    cout << "After swap: " << "\n";
    cout << firstNum << secondNum << "\n";

    return 0;
}
```

Part 3: Function Overloading

A program that reads two integers and two characters. Overload the function larger to be able to compare the two integers and also compare the two characters. Use the following prototypes:

int larger(int x, int y);

char larger(char first, char second);

```
#include<iostream>
using namespace std;
int larger(int x, int y);
char larger(char first, char second);
int main()
{
    int a,b;
    char c,d;

    cout<< "Enter two integers\n";
    cin>>a>>b;
    cout<<"The larger number is: "<<larger(a,b)<<endl<<endl;

    cout<<"Enter two characters\n";
    cin>>c>>d;

    cout<<"The larger character is: "<<larger(c,d)<<endl<<endl;
}
int larger(int x, int y)
{
    if(x > y)
        return x;
    return y;
}
```

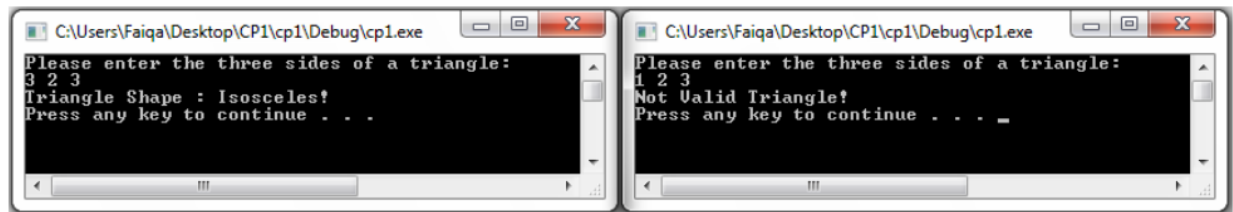
```
char larger(char x, char y)
{
    if(x > y)
        return x;
    return y;
}
```

EXERCISES

Enumerations and Function Overloading

KEYWORDS: enum, function overloading, default parameter

Program 1: Define an enumeration type, triangleType, that has the values scalene, isosceles, equilateral, and noTriangle. Write a function, triangleShape, that takes as parameters three numbers, each of which represents the length of the sides of the triangle. The function should return the shape of the triangle. (Note: In a triangle, the sum of the lengths of any two sides is greater than the length of the third side).

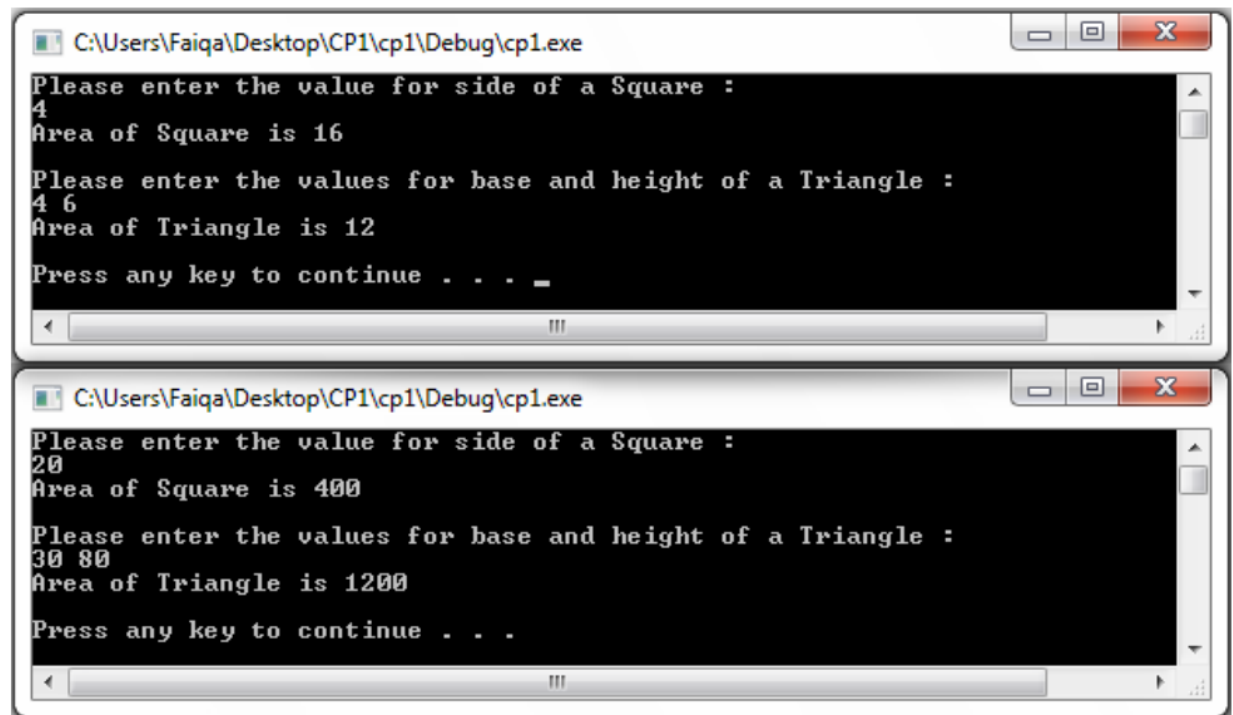


```
C:\Users\Faiqa\Desktop\CP1\cp1\Debug\cp1.exe
Please enter the three sides of a triangle:
3 2 3
Triangle Shape : Isosceles!
Press any key to continue . . .

C:\Users\Faiqa\Desktop\CP1\cp1\Debug\cp1.exe
Please enter the three sides of a triangle:
1 2 3
Not Valid Triangle!
Press any key to continue . . .
```

Sample Output: Program 1

Program 2: Write overloaded function for calculating the area of square and rectangle named area (int side) and area (int base, int height) respectively. Write a program that accept side of a square as input and returns its area using the overloaded function named area. The program also accepts base and height of a rectangle and returns its area using the overloaded function named area.



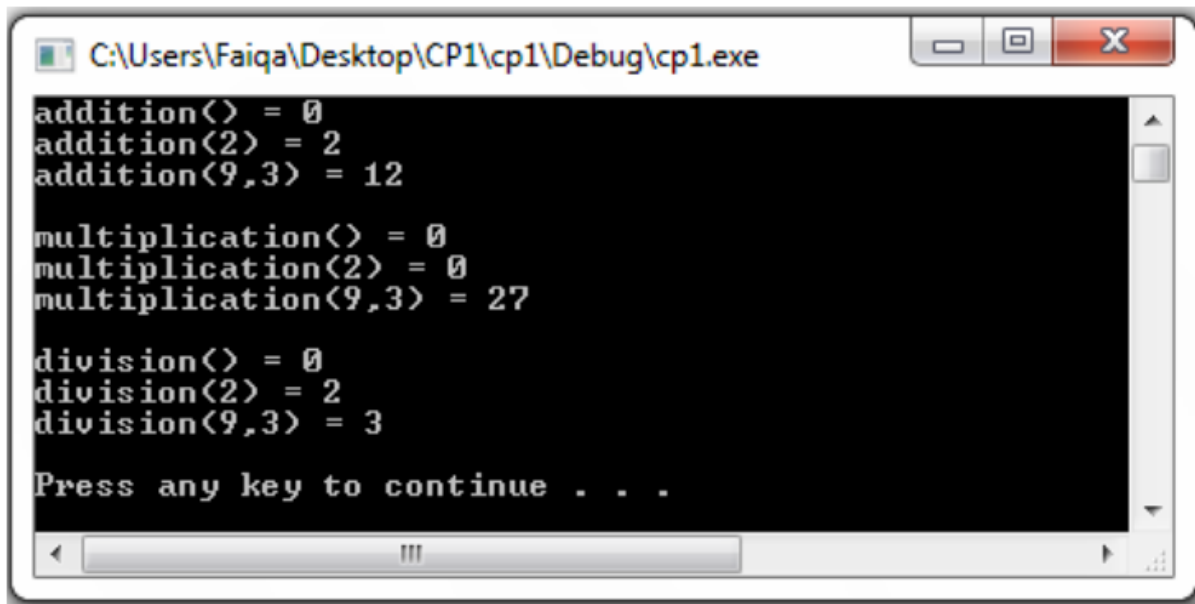
```
C:\Users\Faiqa\Desktop\CP1\cp1\Debug\cp1.exe
Please enter the value for side of a Square :
4
Area of Square is 16
Please enter the values for base and height of a Triangle :
4 6
Area of Triangle is 12
Press any key to continue . . .

C:\Users\Faiqa\Desktop\CP1\cp1\Debug\cp1.exe
Please enter the value for side of a Square :
20
Area of Square is 400
Please enter the values for base and height of a Triangle :
30 80
Area of Triangle is 1200
Press any key to continue . . .
```

Sample Output: Program 2

Program 3: Write functions with default argument for addition, multiplication, and division of two numbers. For addition and multiplication, the default values for two numbers will be 0. For division the default value for first and second arguments will be zero and one respectively. Use the above function for finding addition, multiplication, and division when

- 1) No arguments are supplied,
- 2) First argument is 2 and second argument is not supplied,
- 3) Arguments are 9 and 3.



```
C:\Users\Faiqa\Desktop\CP1\cp1\Debug\cp1.exe  
addition<> = 0  
addition<2> = 2  
addition<9,3> = 12  
  
multiplication<> = 0  
multiplication<2> = 0  
multiplication<9,3> = 27  
  
division<> = 0  
division<2> = 2  
division<9,3> = 3  
  
Press any key to continue . . .
```

Sample Output: Program 3