FUNCTIONS (PART 2 OVERLOAD, TEMPLATES AND RECURSION) LAB # 7



Spring 2022 CSE102L Computer Programming Lab

Submitted by: Ali Asghar

Registration No.: 21PWCSE2059

Class Section: C

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Student Signature: _____

Submitted to:

Engr. Abdullah Hamid

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Department of Computer Systems Engineering
University of Engineering and Technology, Peshawar

Lab Objective(s)

- To understand the programming of recursive functions and overloading functions
- To understand function programming, its types and function-call

TASK # 1:

Title:

Print your name and registration number 10 times in C++ using recursion.

CODE SCREENSHOTS:

```
#include<iostream>
 2
     using namespace std;
 3
 4
     void info();
 5
   ⊟main(){
 6
 7
          info();
8
9
10
   □void info(){
11
          static int i = 1;
12
          if(i <= 10){
13
              cout<<"Ali Asghar\n";</pre>
14
              cout<<"21PWCSE2059\n\n";
15
16
17
          else
18
              exit(0);
19
20
          i++;
21
          info();
22
```

Here is the screenshot of the output of above code.



TASK # 2:

Title:

Write a C++ program where you take two values from.....and calculate their sum. **CODE**

SCREENSHOTS:

```
x main.cpp x main.cpp x
 1
      #include<iostream>
 2
     using namespace std;
 3
 4
     float add(float, float);
 5
 6
    ⊟main(){
 7
          float a = 0, b = 0;
 8
          cout<<"Enter a"<<endl;</pre>
 9
          cin>>a;
10
          cout<<"Enter b"<<endl;</pre>
11
12
13
          cout<<"Sum = "<<add(a,b);
14
15
    □float add(float x,float y){
16
17
18
          if(x == 0 )
19
              x = 1;
20
21
          if(y == 0)
              y = 1;
22
23
24
          int r = x + y;
25
          return r;
26
```

Here are the screenshots of the output of above code.

```
■ "D:\uni\2nd Semester\CP\CP Lab\Lab Reports\Lab 7\task 2\main.exe" — X

Enter a
23

Enter b
12

Sum = 35

Process returned 0 (0x0) execution time: 4.393 s

Press any key to continue.
```

```
■ "D:\uni\2nd Semester\CP\CP Lab\Lab Reports\Lab T\task 2\main.exe" — X

Enter a
0
Enter b
0
Sum = 2
Process returned 0 (0x0) execution time: 3.110 s

Press any key to continue.
```

TASK #3:

Title:

Write a function to find Sum of N natural numbers using Recursion.

CODE SCREENSHOTS:

```
#include<iostream>
1
2 using namespace std;
 3
 4 void sum(int);
 5
 int N = 0;
 7
 8
9
         cout<<"Enter N";</pre>
10
         cin>>N;
11
12
         sum(N);
13
14
15 \squarevoid sum(int n){
16
         static int s = 0;
17
```

```
*main.cpp ×
11
12
         sum(N);
13
14
15 = void sum(int n) {
         static int s = 0;
16
17
18
         if(n >= 0) {
19
              s += n;
20
             n--;
21
              sum(n);
22
23
        else{
24
              cout<<"Sum = "<<s;
25
             exit(0);
26
      }
27
```

Here is the screenshot of the output of above code.

```
■ "D:\uni\2nd Semester\CP\CP Lab\Lab Reports\Lab 7\task 3\main.exe" — X

Enter N40

Sum = 820

Process returned 0 (0x0) execution time : 4.157 s

Press any key to continue.
```

TASK #4:

Title:

Calculate the sum of odd natural numbers 1+3+5+7+...... + n using Recursion....n as input from user.

CODE SCREENSHOTS:

```
main.cpp × *main.cpp ×
      #include<iostream>
 1
 2
      using namespace std;
 3
 4
 5
      void sum(int);
 6
 7
    \negmain(){
 8
           int N = 0;
 9
           cout<<"Enter N";</pre>
10
11
           cin>>N;
12
13
           sum(N);
14
15
    void sum(int n){
16
17
           static int s = 0;
```

Here is the screenshot of the output of above code.

TASK # 5:

Title:

Overload three functions with name "grade"...... Consider total marks = 150.

CODE SCREENSHOTS:

```
× main.cpp × *task5.cpp ×
      #include<iostream>
 1
 2
      using namespace std;
 3
 4

float grade(int marks) {

 5
 6
           float marks2 = (float) marks;
 7
           float percentage;
 8
 9
          percentage = ((marks2/150) * 100);
10
          return percentage;
11
12
13
    char grade(float percentage) {
14
15
16
17
          if (percentage >= 90 && percentage <= 100 )</pre>
          return 'A';
18
19
```

```
main.cpp × *task5.cpp ×
19
20
           else if(percentage >= 80 && percentage <= 90 )</pre>
21
           return 'B';
22
           else if(percentage >= 70 && percentage <= 80 )</pre>
23
          return 'C';
24
25
          else if(percentage >= 50 && percentage <= 70 )</pre>
26
          return 'D';
27
28
29
          else
30
          return 'F';
31
32
33
34
    □void grade(){
35
36
           int marks = 0;
37
           float percentage = 0;
```

```
main.cpp × *task5.cpp ×
    □void grade(){
34
35
36
          int marks = 0;
37
          float percentage = 0;
38
39
          cout<<"Enter marks..."<<endl;</pre>
40
          cin>>marks;
41
42
          percentage = grade(marks);
43
          cout<<"Marks is ="<<marks<<endl;</pre>
44
45
          cout<<"Percentage is ="<<percentage<<"%"<<endl;</pre>
          cout<<"Grade is ="<<grade(percentage);</pre>
46
47
48
49
    ⊟main(){
50
          grade();
     }
51
52
```

Here is the screenshot of the output of above code.

```
■ "D:\uni\2nd Semester\CP\CP Lab\Lab Reports\Lab T\task 5\task5.exe" — 

Enter marks...

123

Marks is =123

Percentage is =82%

Grade is =B

Process returned 0 (0x0) execution time: 1.876 s

Press any key to continue.
```

TASK # 6:

Title:

Write a C++ Program to Find Factorial of a Number Using Recursion.

CODE SCREENSHOTS:

```
main.cpp × task5.cpp × factorial.cpp ×
      #include <iostream>
 1
 2
      using namespace std;
 3
    int64 t re(int64 t);
 4
 5
 6
      main(){
 7
           int64 t num = 0;
 8
           int64 t fact = 1;
           cout<<"Enter number"<<endl;</pre>
 9
           cin>>num;
10
11
12
           fact = re(num);
           cout<<"Factorial = "<<fact;</pre>
13
14
15
16
17
      int64 t re(int64 t n) {
```

```
main.cpp × task5.cpp × factorial.cpp ×
           cout<<"Enter number"<<endl;</pre>
 9
10
           cin>>num;
11
12
           fact = re(num);
           cout<<"Factorial = "<<fact;</pre>
13
14
15
16
17
      int64_t re(int64_t n) {
18
           if (n==0 | | n==1)
19
20
                return 1;
21
22
           else
23
                return n*re(n - 1);
24
```

Here is the screenshot of the output of above code.

```
■ "D:\uni\2nd Semester\CP\CP Lab\Lab Reports\Lab T\task 6\factorial.exe" — X

Enter number

34

Factorial = 4926277576697053184

Process returned 0 (0x0) execution time: 2.579 s

Press any key to continue.
```

TASK #7:

Title:

C++ program to print Fibonacci series using recursion.

CODE SCREENSHOTS:

```
main.cpp \times task5.cpp \times factorial.cpp \times main.cpp \times
 #include <iostream>
 2
      using namespace std;
 3
 4
    ∃int fibonacci(int N){
 5
            int c;
 6
            static int a=0,b=1;
 7
           if(a==0)
 8
                 cout<<a<<"\n"<<b<<"\n";</pre>
 9
           c=a+b;
           a=b;
10
11
           b=c;
           cout<<c<"\n";
12
13
14
           if(c>N)
15
                 return 0;
16
           else
17
                 fibonacci(N);
18
```

```
main.cpp × task5.cpp × factorial.cpp × main.cpp ×
9
           c=a+b;
10
           a=b;
11
           b=c;
12
           cout<<c<"\n";
13
14
           if(c>N)
15
                return 0;
16
           else
17
                fibonacci(N);
18
19
20 = main()
21
           int n;
22
           cout<<"Enter a number: ";</pre>
23
           cin>>n;
24
           fibonacci(n);
25
26
```

Here is the screenshot of the output of above code.

```
■ "D:\uni\2nd Semester\CP\CP Lab\Lab Reports\Lab 7\task 7\main.exe" — X

Enter a number: 6

3

1

1

2

3

5

8

Process returned 0 (0x0) execution time: 2.844 s

Press any key to continue.
```

TASK #8:

Title:

C++ program to calculate power of a number using recursion.

CODE SCREENSHOTS:

```
main.cpp × task5.cpp × factorial.cpp × main.cpp × main.cpp ×
 #include <iostream>
      using namespace std;
 3

—int powerFunction(int B, int E){
 5
 6
          static int power = 1;
 7
 8
          power = power * B;
 9
          E--;
10
11
          if(E == 0)
12
               return power;
13
14
          else
15
               powerFunction(B,E);
16
17
18
19
    ⊟main(){
20
          int b,e;
21
22
          cout<<"Enter base number: ";</pre>
                                                                                Activate Windows
```

```
× main.cpp × task5.cpp × factorial.cpp × main.cpp × main.cpp ×
 9
           E--;
10
11
           if(E == 0)
12
               return power;
13
14
           else
15
               powerFunction(B,E);
16
17
18
19
    ⊟main(){
20
           int b,e;
21
22
           cout<<"Enter base number: ";</pre>
23
           cin>>b;
24
25
           cout<<"Enter the exponent of the number: ";</pre>
26
           cin>>e;
27
           cout<<"Power of "<<b<<" raised to exponent "<<e<" = "<<powerFunction(b,e);</pre>
28
29
```

Here is the screenshot of the output of above code.

```
□ "D:\uni\2nd Semester\CP\CP Lab\Lab Reports\Lab 7\task 8\main.exe"  

Enter base number: 4
Enter the exponent of the number: 3
Power of 4 raised to exponent 3 = 64
Process returned 0 (0x0) execution time: 5.928 s
Press any key to continue.
```