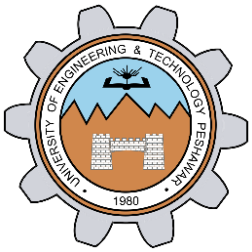
FUNCTIONS (PART 2 OVERLOAD, TEMPLATES AND RECURSION)

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

July 4, 2022

Department of Computer Systems Engineering

University of Engineering and Technology, Peshawar

Name: Ali Asghar Section: C Registration # :21PWCSE2059

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:

Here are the screenshots of the code.

main.cpp

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

void info();

main(){
    info();
}

void info(){
    static int i = 1;
    if(i <= 10){
        cout<<"Ali Asghar\n";
        cout<<"21PWCSE2059\n\n";
    }

    else
        exit(0);

    i++;
    info();
}
```

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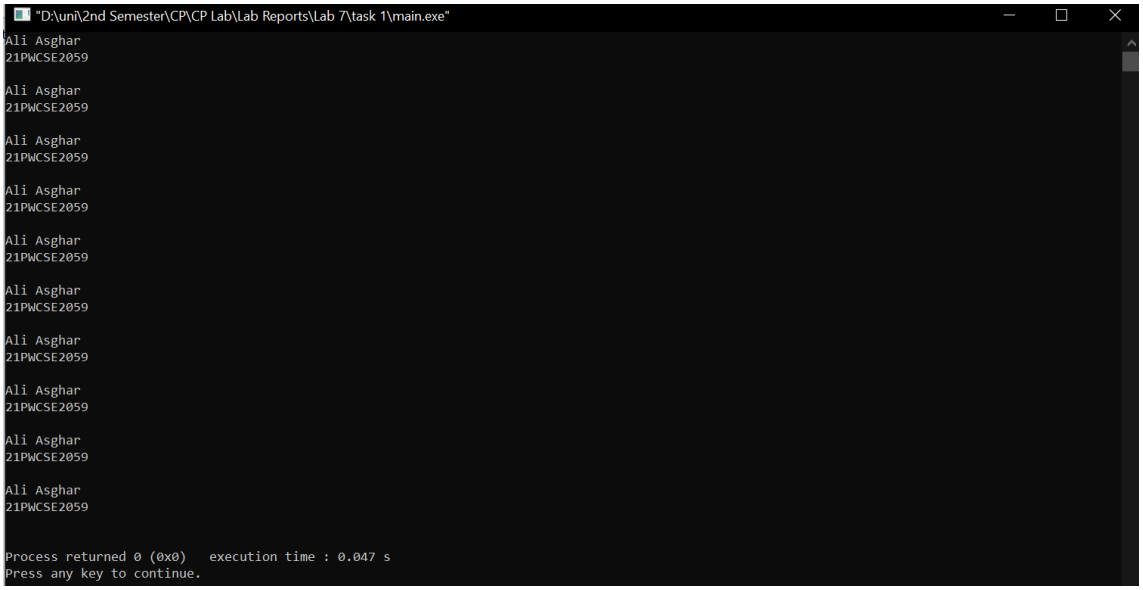
OUTPUT (COMPILATION, DEBUGGING & TESTING):

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:

Here is the screenshot of the code.

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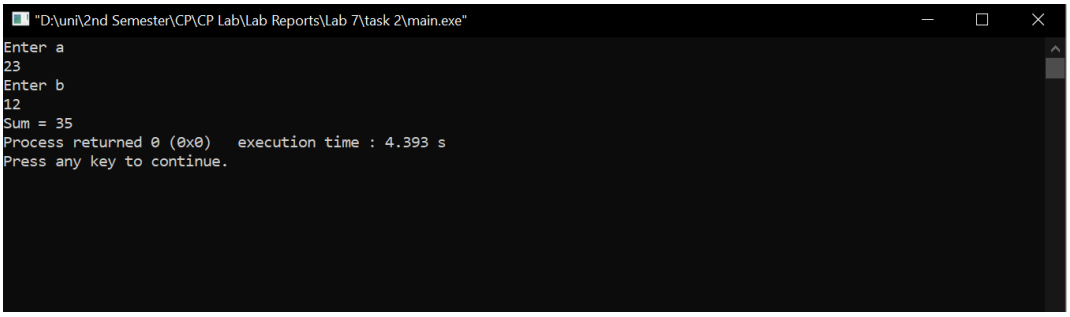
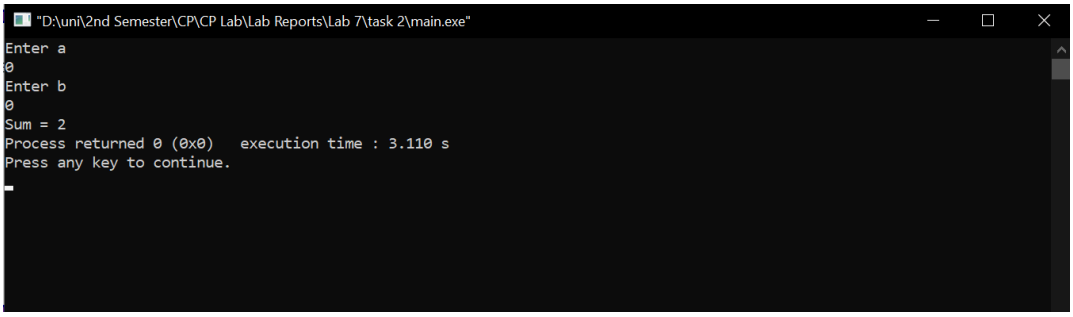
```cpp
#include<iostream>
using namespace std;

float add(float,float);

main(){
    float a = 0, b =0;
    cout<<"Enter a"<<endl;
    cin>>a;
    cout<<"Enter b"<<endl;
    cin>>b;

    cout<<"Sum = "<<add(a,b);
}

float add(float x,float y){

    if(x == 0 )
        x = 1;

    if(y == 0)
        y = 1;

    int r = x + y;
    return r;
}
```

OUTPUT (COMPILATION, DEBUGGING & TESTING):

Here are the screenshots of the output of above code.





TASK # 3:

Title:

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

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CODE SCREENSHOTS:

Here is the screenshot of the code.

*main.cpp

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

void sum(int);

main(){
    int N = 0;

    cout<<"Enter N";
    cin>>N;

    sum(N);
}

void sum(int n){
    static int s = 0;

```

*main.cpp

```cpp
    sum(N);
}

void sum(int n){
    static int s = 0;

    if(n >= 0){
        s += n;
        n--;
        sum(n);
    }
    else{
        cout<<"Sum = "<<s;
        exit(0);
    }
}
```

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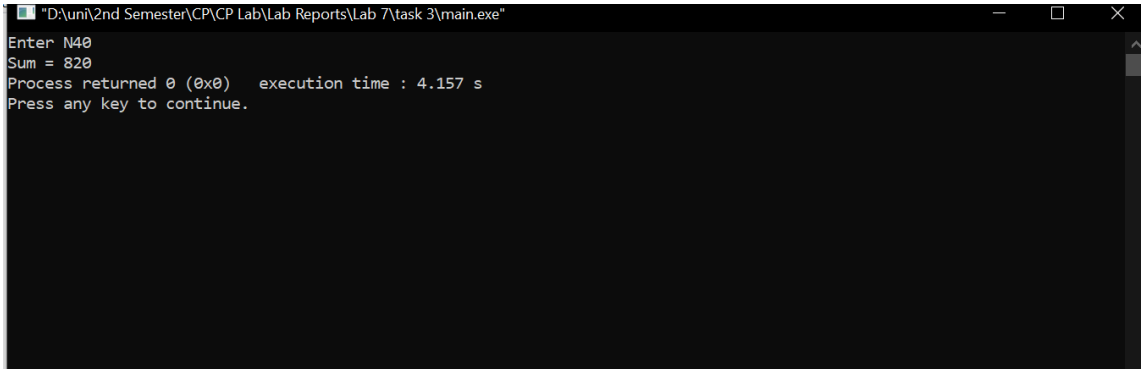
OUTPUT (COMPILATION, DEBUGGING & TESTING):

Here is the screenshot of the output of above code.



TASK # 4:

Title:

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

CODE SCREENSHOTS:

Here is the screenshot of the code.

main.cpp *main.cpp

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


void sum(int);

main(){
    int N = 0;

    cout<<"Enter N";
    cin>>N;

    sum(N);
}

void sum(int n){
    static int s = 0;
```

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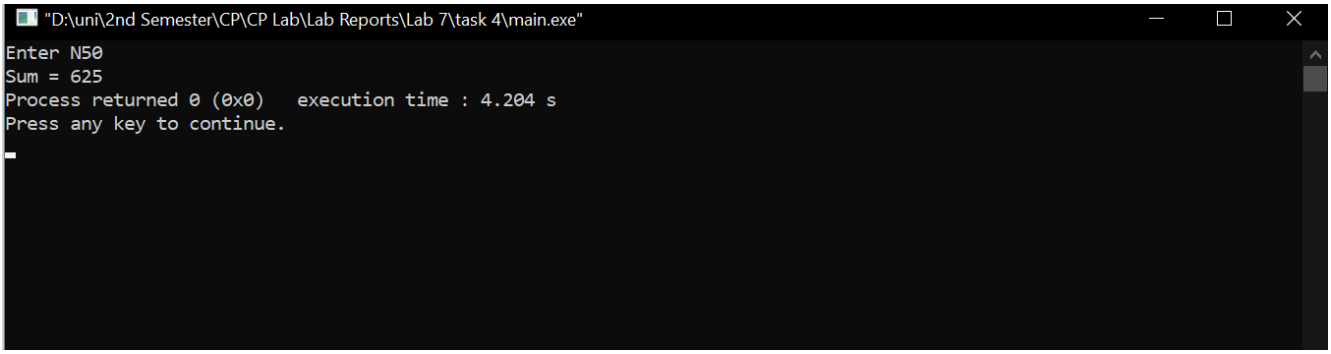
OUTPUT (COMPILATION, DEBUGGING & TESTING):

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:

Here are the screenshots of the code.

main.cpp *task5.cpp

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

float grade(int marks){

    float marks2 = (float)marks;
    float percentage;

    percentage =((marks2/150) * 100);
    return percentage;
}

char grade(float percentage){



    if(percentage >= 90 && percentage <= 100 )
    return 'A';

```

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main.cpp *task5.cpp

```
19
20      else if(percentage >= 80 && percentage <= 90 )
21      return 'B';
22
23      else if(percentage >= 70 && percentage <= 80 )
24      return 'C';
25
26      else if(percentage >= 50 && percentage <= 70 )
27      return 'D';
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

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

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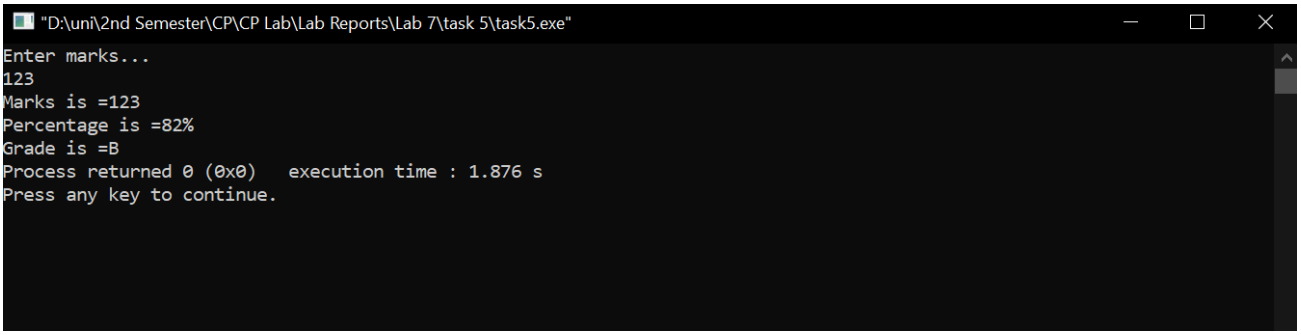
OUTPUT (COMPILATION, DEBUGGING & TESTING):

Here is the screenshot of the output of above code.



TASK # 6:

Title:

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

CODE SCREENSHOTS:

Here are the screenshots of the code.

main.cpp | task5.cpp | factorial.cpp

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

int64_t re(int64_t);

main(){
    int64_t num =0;
    int64_t fact = 1;
    cout<<"Enter number"<<endl;
    cin>>num;

    fact = re(num);
    cout<<"Factorial = "<<fact;

}

int64_t re(int64_t n){
```

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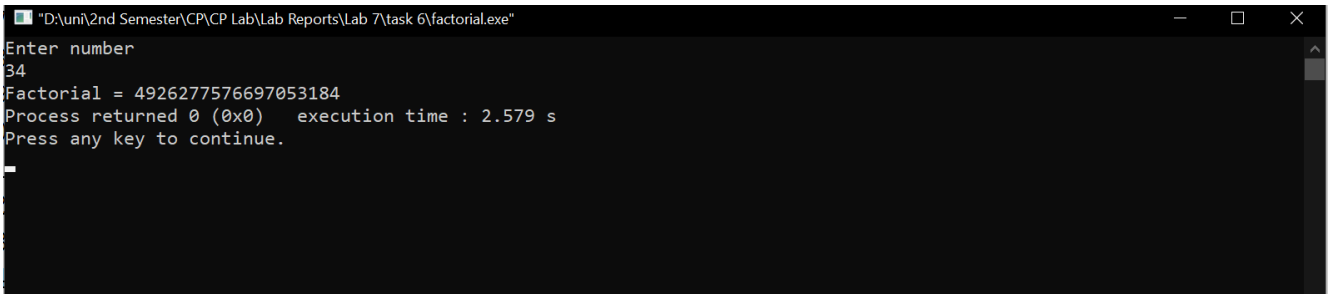
main.cpp | task5.cpp | factorial.cpp

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

OUTPUT (COMPILATION, DEBUGGING & TESTING):

Here is the screenshot of the output of above code.



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TASK # 7:

Title:

C++ program to print Fibonacci series using recursion.

CODE SCREENSHOTS:

Here are the screenshots of the code.

main.cpp | task5.cpp | factorial.cpp | main.cpp

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

int fibonacci(int N){
    int c;
    static int a=0,b=1;
    if(a==0)
        cout<<a<<"\n"<<b<<"\n";
    c=a+b;
    a=b;
    b=c;
    cout<<c<<"\n";

    if(c>N)
        return 0;
    else
        fibonacci(N);
}
```

main.cpp | task5.cpp | factorial.cpp | main.cpp

```cpp
    c=a+b;
    a=b;
    b=c;
    cout<<c<<"\n";

    if(c>N)
        return 0;
    else
        fibonacci(N);
}

main(){
    int n;
    cout<<"Enter a number: ";
    cin>>n;
    fibonacci(n);
}
```

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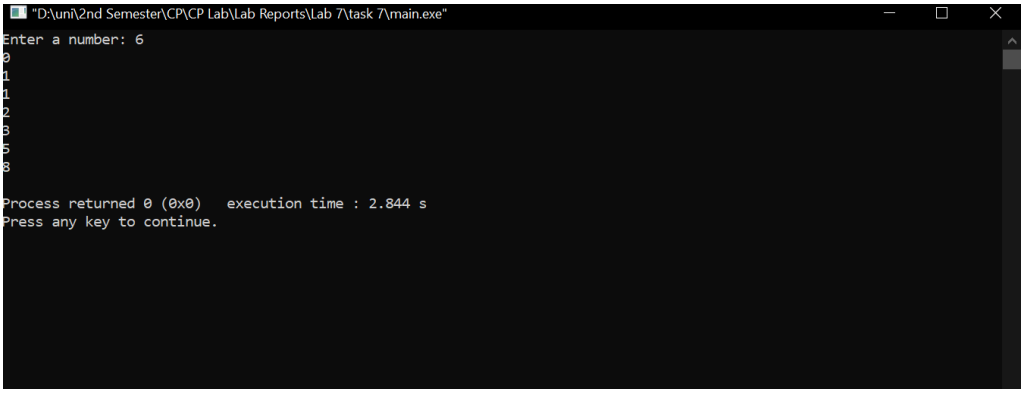
OUTPUT (COMPILATION, DEBUGGING & TESTING):

Here is the screenshot of the output of above code.



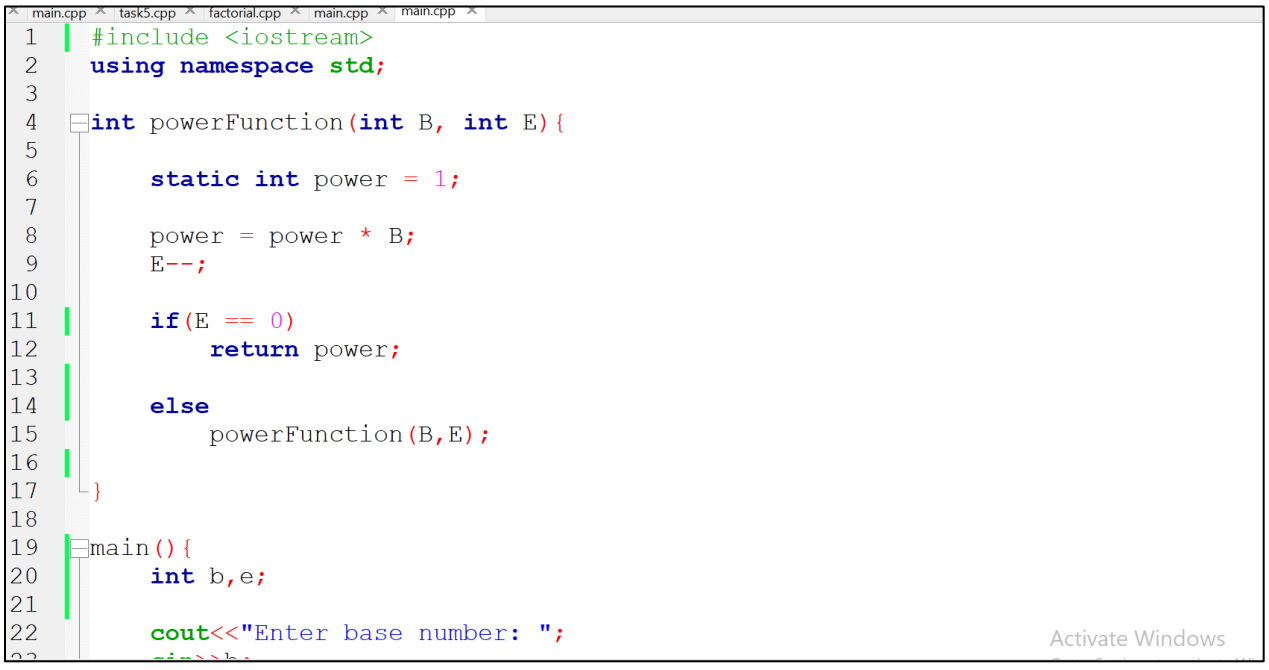
TASK # 8:

Title:

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

CODE SCREENSHOTS:

Here are the screenshots of the code.



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```cpp
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: ";
23      cin>>b;
24
25      cout<<"Enter the exponent of the number: ";
26      cin>>e;
27
28      cout<<"Power of "<<b<<" raised to exponent "<<e<<" = "<<powerFunction(b,e);
29  }
```

OUTPUT (COMPILATION, DEBUGGING & TESTING):

Here is the screenshot of the output of above code.