INDIRA GANDHI DELHI TECHNICAL UNIVERSITY FOR WOMEN

Object Oriented Programming
Practical File

BIT-204

Submitted by:

NAME :- Latika kardam
ROLL NO. :- 18901012020
CSE 2 B2

Submitted to:

Ms. VIBHA

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Experiment No. 1

Aim:

Write a program to calculate the factorial of a number using functions.

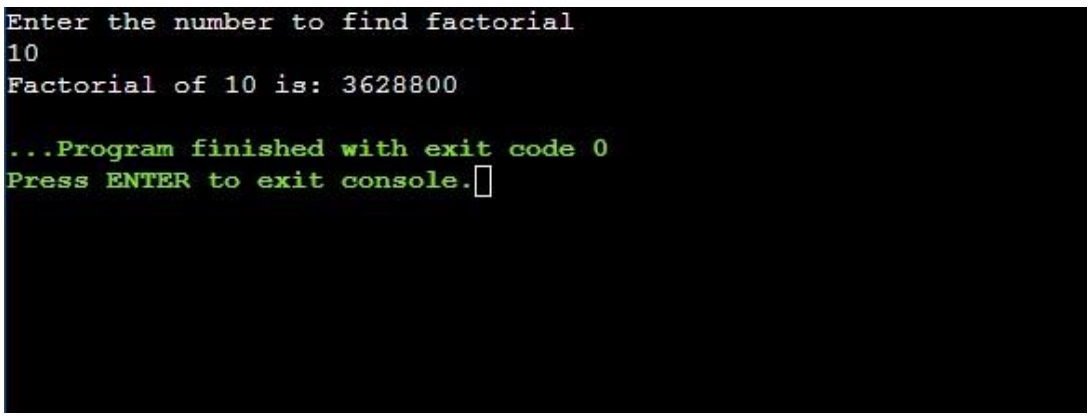
Code:

```
#include <iostream>
#include <conio.h>
using namespace std;

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

int
main()  {
int n;
   cout << "Enter the number to find factorial"
<< endl;    cin>>n;    factorial(n);    getch();
return 0;
}
```

Output:



Experiment No. 2

Aim:

Write a program to check if a number is prime or not using functions.

Code:

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

void isPrime(int n)
{
  int i, flag = 0;
  for(i=2; i<=n/2; ++i)
  {
    if(n%i==0)
    {
flag=1;
break;
    }  }  if
(flag==0)
  cout<<n<<" is a prime
number"<<endl;  else
  cout<<n<<" is not a prime number"<<endl;
}      int
main()  {
int n;
   cout<<"Enter  a  number  to  check
prime  :  ";      cin>>n;      isPrime(n);
return 0;
}
```

Output:

```
Enter a number to check prime : 10
10 is not a prime number


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter a number to check prime : 7
7 is a prime number


...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No. 3

Aim:

Write a program to calculate of a student using classes. It should maintain student's record. Input is basic info of the student and make member functions as public to display and read marks.

Code:

```
#include
<iostream> using
namespace   std;
class marks
{   public:   float
f;   int
a,b,c,d,e,rollno;
  char name[70];

  void read()
  {
  cout << endl << "Enter the marks below:" << endl;
  cout << "Data Structures:
" ;   cin >> a;
  cout << "Discrete Structures:
" ;   cin >> b;
  cout << "Database Management:
" ;   cin >> c;
  cout << "Software engineering:
" ;   cin >> d;
  cout << "Material Science: " ;
  cin >> e;
  f =(a+b+c+d+e)/5;
  }

  void display()
  {
    cout<<"RollNo. :"<<rollno<<endl;
cout<<"Name   :"<<name<<endl;
    cout<<"Marks obtained in different
subjects:"<<endl;      cout<<"Data structures
:"<<a<<endl;      cout<<"Discrete structures
:"<<b<<endl;      cout<<"Database Management
:"<<c<<endl;      cout<<"Software
Engineering:"<<d<<endl;      cout<<"Material
Science   :"<<e<<endl;      cout<<"Percentage
obtained:"<<  f<<"%"<<endl;
```

Experiment No. 4

Aim:

}

```
};

int main ()
{
   int i,n,k,l;
marks pe[50];
   cout<< "Enter the total no. of students in the
class:";    cin>> n;    if (n>50)
   { cout<<"Invalid no. of students";}
   else {
   cout<<"----------Enter Student Details----------"<<endl;
for(i=0;i<n;i++)
   {
    cout<<"Rollno.:";
cin>>pe[i].rollno;
cout<<"Name   :" ;
cin>>pe[i].name;
cout<<endl;
   }
   for (k=0;k<n;k++)
   {
    cout<<"Rollno. "<< pe[k].rollno;
      pe[k].read();
      cout<<endl;
   }
   cout<<"----------Student Details----------
"<<endl;    for (l=0;l<n;l++)
   {
      pe[l].display();
      cout<<endl;
   }   }
return 0;
}
```

Aim:

Output:

```
Enter the total no. of students in the class:2
---------------Enter Student Details-----------------
Rollno.:158
Name   :ashlesha

Rollno.:189
Name   :latika

Rollno. 158
Enter the marks below:
Data Structures: 95
Discrete Structures: 89
Database Management: 97
Software engineering: 88
Material Science: 93

Rollno. 189
Enter the marks below:
Data Structures: 84
Discrete Structures: 63
Database Management: 86
Software engineering: 83
Material Science: 72

-----------------Student Details-----------------
RollNo. :158
Name    :ashlesha
Marks obtained in different subjects:
Data structures     :95
Discrete structures :89
Database Management :97
Software Engineering:88
Material Science    :93
Percentage obtained:92%

RollNo. :189
Name    :latika
Marks obtained in different subjects:
Data structures     :84
Discrete structures :63
Database Management :86
Software Engineering:83
Material Science    :72
Percentage obtained:77%



...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No. 4

Write a program to show the use of i) Swapping using call by value, call by reference, call by address ii) Default value iii) and show function overloading.

Code:

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

   int swap(int a, int b=0)
   {
int c;
c=a;
a=b;
b=c;
      cout<<"The number a and b respectively are: "<<a<<" and
"<<b<<endl;       return 0;
   }

   int swap(float *d, float *e)
{   float f;
f=*d;
*d=*e;
*e=f;
return 0;
}

int add(int *a, int *b)
{
   int          c;
c=(*a)+(*b);
return c;
}

int main()
{
   int num1, num2;
float num3, num4;
   cout<<endl<<"----------SWAPPING THE NUMBERS----------
"<<endl;    cout<<endl<<"Enter the integers to be swapped
below:"<<endl;    cout<<"a: ";    cin>>num1;    cout<<"b: ";
cin>>num2;
```

Aim:

```
   cout<<endl<<"Enter the real numbers to be swapped
below:"<<endl;    cout<<"d: ";    cin>>num3;
   cout<<"e: ";
cin>>num4;
   cout<<endl<<"----After Swapping----"<<endl;
   cout<<swap(&num3,&num4);
   cout<<"The number d and e respectively are: "<<num3<<" and
"<<num4<<endl;    cout<<endl<<swap(num1,num2);
   cout<<"(The numbers d and e respectively in the main function are:
"<<num3<<" and
"<<num4<<")"<<endl;
   cout<<"(The numbers a and b respectively in the main function are:
"<<num1<<" and
"<<num2<<")"<<endl;
   cout<<endl<<"-------------------------------------------------------------------------";
cout<<endl<< "Swapping after passing only one integer a in the
function:"<<endl;    cout<<swap(num1)<<endl;
   cout<<"(The numbers a and b respectively in the main function are:
"<<num1<<" and
"<<num2<<")"<<endl;
   cout<<endl<<"-------------------------------------------------------------------------";
cout<<endl<<"Now the addition of a and b is:
"<<add(&num1,&num2)<<endl<<endl;     cout<<endl<<"-------------------------
-----------------------------------------";    return 0;
}
```

Output:

Output

```
/tmp/jSKi0S3zYe.o
----------SWAPPING THE NUMBERS-----------

Enter the integers to be swapped below:
a: 1
b: 3
Enter the real numbers to be swapped below:
d: 3
e: 5
----After Swapping----
OThe number d and e respectively are: 5 and 3

The number a and b respectively are: 3 and 1
O(The numbers d and e respectively in the main function are: 5 and 3)
(The numbers a and b respectively in the main function are: 1 and 3)

--------------------------------------------------------------------------------
Swapping after passing only one integer a in the function:
The number a and b respectively are: 0 and 1
0
(The numbers a and b respectively in the main function are: 1 and 3)

--------------------------------------------------------------------------------
Now the addition of a and b is: 4


--------------------------------------------------------------------------------
```

Experiment No.

Aim:

5

Write a program to show the use of references, inline functions, macros, dynamic memory allocation using new and delete, scope and resolution operator.

Code:

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

int s=40;

#define Print_square cout<<endl<<"Square of local variable s is: "<<s*s;

inline int sum (int a, int b)
{
   return a+b;
}

void increment (int& s)
{
s++;
}

int main ()
{  int
  a,b,c;
    cout<<endl<<"Enter the numbers to be added
  below: "<<endl;  cout<<"Enter a: ";  cin>>a;
  cout<<"Enter b: ";  cin>>b;   c=sum(a,b);
  cout<<endl<<"The sum of a and b is: "<<c;

  int s;
  s=12;
  cout<<endl<<"_____
  __
_____"<<endl;
  Print_square
  cout<<endl<<"s as local variable is: "<<s;
  increment(s);
  cout<<endl<<endl<<"-------After incrementing the value of s-------";
  Print_square
```

```
  cout<<endl<<endl<<"s as local variable is: "<<s;
  cout<<endl<<"s as global variable is: "<<::s;

  cout<<endl<<"_____
  __ _____"<<endl; int *d; d = new int; *d=10;
  cout<<endl<<"Pointer d points to a value of:
  "<<*d<<endl; delete d;
  cout<<endl<<"---------AFTER USING- delete operator---------";
  cout<<endl<<"Pointer d points to a value of: "<<*d<<endl<<endl;

  return 0;
}
```

Output:

```
Output
/tmp/WCWmnOvZMx.o
Enter the numbers to be added below:
Enter a: 5
Enter b: 10
The sum of a and b is: 15
_____

Square of local variable s is: 144
s as local variable is: 12

-------After incrementing the value of s-------
Square of local variable s is: 169

s as local variable is: 13
s as global variable is: 40
_____

Pointer d points to a value of: 10

---------AFTER USING- delete operator---------
Pointer d points to a value of: 0
```

Experiment No.

Aim:

6

Write a program to show addition of complex numbers using friend functions, objects as arguments by value and reference.

Code:

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

class cl
{
private:
   int sum1, sum2;
float sumi, sumr;
public:
   int img1, img2, real1, real2;
   float img_1, img_2, real_1, real_2;

   friend void complex1(cl d);
friend int complex2(cl &d);
};

void complex1 (cl d)
{
   d.sum1 = d.img1 + d.img2;
   d.sum2 = d.real1 + d.real2;    cout<<endl<<endl<<"Sum of the
Two complex numbers in the function is:
"<<d.sum2<<" + i"<<d.sum1;
}

int complex2 (cl &d)
{
   d.sumi = d.img_1 + d.img_2;
   d.sumr = d.real_1 + d.real_2;    cout<<endl<<endl<<"Sum of
the Two complex numbers in the function is:
"<<d.sumr<<" + i"<<d.sumi;
}

int main()
{
   cl d;
```

```
   cout<<endl<<"Enter the complex numbers (int values) below:"<<endl;
cout<<endl<<"Complex Number 1:"<<endl;
   cout<<"Real part: ";
cin>>d.real1;
cout<<"Imaginary part: ";
cin>>d.img1;
   cout<<endl<<"Complex Number 2:"<<endl;
   cout<<"Real part: ";
cin>>d.real2;
cout<<"Imaginary part: ";
cin>>d.img2;
cout<<endl<<"The two complex numbers are: "<<d.real1<<" +
i"<<d.img1<<"  and
"<<d.real2<<" + i"<<d.img2;
   complex1(d);

cout<<endl<<"_____________________________________________________________
__
_____";
   cout<<endl<<endl<<"Enter the complex numbers (float values)
below:"<<endl;    cout<<endl<<"Complex Number 1:"<<endl;
   cout<<"Real part: ";
cin>>d.real_1;
cout<<"Imaginary part: ";
cin>>d.img_1;
   cout<<endl<<"Complex Number 2:"<<endl;
   cout<<"Real part: ";
cin>>d.real_2;
cout<<"Imaginary part: ";
cin>>d.img_2;
   cout<<endl<<"The two complex numbers are: "<<d.real_1<<" +
i"<<d.img_1<<"  and
"<<d.real_2<<" + i"<<d.img_2;
   complex2(d);

cout<<endl<<"_____________________________________________________________
_"
<<endl;
return 0;
}
```

Output:

Experiment No.

Aim:

```
Enter the complex numbers (int values) below:

Complex Number 1:
Real part: 3
Imaginary part: 2

Complex Number 2:
Real part: 5
Imaginary part: 1

The two complex numbers are: 3 + i2  and  5 + i1

Sum of the Two complex numbers in the function is:     8 + i3
_____________________________________________________________

Enter the complex numbers (float values) below:

Complex Number 1:
Real part: 2.1
Imaginary part: 5.4

Complex Number 2:
Real part: 1.1
Imaginary part: 9.7

The two complex numbers are: 2.1 + i5.4  and  1.1 + i9.7

Sum of the Two complex numbers in the function is: 3.2 + i15.1
_____________________________________________________________


...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No.

7

Aim: **Write a program to perform operations on matrices using class like addition, subtraction, multiplication, transpose.**

Code:

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

class arr {      public:
int              a[20][20],
b[20][20];
};

void trans(int a[][20], int m, int n)
{
   int b[20][20];    for
(int i=0; i<m; i++)
   {
      for (int j=0; j<n; j++)
      {
         b[j][i]=a[i][j];
      }
   }
   cout<<endl<<"The transpose: A'"<<endl;
   for(int i=0; i<n; i++)
   {
      for (int j=0; j<m; j++)
      {
         cout<<b[i][j]<<" ";
      }
      cout<<endl;
   } }

void mul(int a[][20], int b[][20], int m, int n, int q)
{  int
c[20][20];
 cout<<endl<<"The product: A*B"<<endl;
 for (int i=0; i<m; i++)
 {
    for (int j=0; j<q; j++)
    {
       c[i][j] =0;
       {
```

```
        for (int k=0; k<n; k++)
        {
        c[i][j]=c[i][j]+(a[i][k]*b[k][j]);
        }
       }
       cout<<c[i][j]<<" ";
    }
    cout<<endl;
 }
}

void add( int a[][20], int b[][20], int m, int n)
{   int
c[20][20];
   for (int i=0; i<m; i++)
   {
      for (int j=0; j<n; j++)
      {
         c[i][j]=b[i][j]+a[i][j];
      }
   }
   cout<<endl<<"The sum: A+B"<<endl;
for(int i=0; i<m; i++)
   {
      for (int j=0; j<n; j++)
      {
         cout<<c[i][j]<<" ";
      }
      cout<<endl;
   }
}

void sub(int a[][20], int b[][20], int m, int n)
{       int c[20][20];
for (int i=0; i<m; i++)
   {
      for (int j=0; j<n; j++)
      {
         c[i][j]=a[i][j]-b[i][j];
      }
   }
   cout<<endl<<"The difference: A-B"<<endl;
   for(int i=0; i<m; i++)
   {
      for (int j=0; j<n; j++)
      {
```

```
        cout<<c[i][j]<<" ";
      }
      cout<<endl;
   }
}

int main()
{           int
  m,n,p,q;
  arr dr;
   cout<<endl<<"Enter the number of rows in matrix A:
  ";  cin>>m;
   cout<<"Enter the number of columns in matrix A:
  ";  cin>>n;
   cout<<endl<<"Enter the number of rows in matrix B:
  ";  cin>>p;
   cout<<"Enter the number of columns in matrix B:
  ";  cin>>q;
   cout<<endl<<"Enter the elements of matrix A
  below:"<<endl;  for(int i=0; i<m; i++)
   {
      for (int j=0; j<n; j++)
      {
        cout<<"A["<<i+1<<"]["<<j+1<<"]: ";
  cin>>dr.a[i][j];
      }
   }
   cout<<endl<<"Enter the elements of matrix B
  below:"<<endl;  for(int i=0; i<p; i++)
   {
      for (int j=0; j<q; j++)
      {
        cout<<"B["<<i+1<<"]["<<j+1<<"]: ";
  cin>>dr.b[i][j];
      }
   }
  cout<<endl<<"_____Matrices A and
  B_____"<<endl; cout<<endl<<" A: "<<endl;    for(int i=0;
  i<m; i++)
     {
        for (int j=0; j<n; j++)
        {
           cout<<dr.a[i][j]<<" ";
        }
        cout<<endl;
     }
     cout<<endl<<" B: "<<endl;
```

```
    for(int i=0; i<p; i++)
    {
       for (int j=0; j<q; j++)
       {
          cout<<dr.b[i][j]<<" ";
       }
       cout<<endl;
    }
   cout<<endl<<"_____Addition of matrices A +
  B_____"<<endl;
   if (m==p&&n==q)
   {
      add(dr.a,dr.b,m,n);
   }
  else
  {
      cout<<endl<<"Addition of matrices is not possible!!!!";
   }

   cout<<endl<<endl<<"_____Subtraction of matrices A -
  B_____"<<endl;
   if (m==p&&n==q)
   {
      sub(dr.a,dr.b,m,n);
   }
  else
  {
      cout<<endl<<"Subtraction of matrices is not possible!!!!";
   }
    cout<<endl<<endl<<"_____Multiplication of matrices
  A*B_____"<<endl;
   if (n==p)
  {
      mul(dr.a,dr.b,m,n,q);
   }
  else
  {
      cout<<endl<<"Multiplication of matrices is not possible!!!!";
   }
    cout<<endl<<endl<<"_____Transpose of matrix
  A_____"<<endl;
  trans(dr.a,m,n);
  cout<<endl<<endl;
   return 0;
}
```

Output:

```
Enter the number of rows in matrix A: 3
Enter the number of columns in matrix A: 3

Enter the number of rows in matrix B: 3
Enter the number of columns in matrix B: 3

Enter the elements of matrix A below:
A[1][1]: 2
A[1][2]: 1
A[1][3]: 5
A[2][1]: 3
A[2][2]: 7
A[2][3]: 9
A[3][1]: 4
A[3][2]: 0
A[3][3]: 6

Enter the elements of matrix B below:
B[1][1]: 0
B[1][2]: 2
B[1][3]: 9
B[2][1]: 5
B[2][2]: 4
B[2][3]: 6
B[3][1]: 7
B[3][2]: 1
B[3][3]: 1

_____Matrices A and B_____

 A:
2 1 5
3 7 9
4 0 6

 B:
0 2 9
5 4 6
7 1 1

_____Addition of matrices A + B_____

The sum: A+B
2 3 14
8 11 15
11 1 7


_____Subtraction of matrices A - B_____

The difference: A-B
2 -1 -4
-2 3 3
-3 -1 5


_____Multiplication of matrices A*B_____

The product: A*B
40 13 29
98 43 78
42 14 42


_____Transpose of matrix A_____

The transpose: A'
2 3 4
1 7 0
5 9 6




...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No. 8

Aim: Write a program to calculate the area and perimeter of circle using classes.

Code:

```
#include<iostrea
m>
#include<conio.h
>                using
namespace   std;
class Circle
{
private:
float r;
public:
   void input()
   {
      cout<<"Enter radius of circle: ";
      cin>>r;
   }
   void Area()
   {
      float a=22.0/7.0*r*r;
      cout<<"\nArea of circle ="<<a;
   }
   void Circumference()
   {
      float p=2*22.0/7.0*r;
      cout<<"\nCircumference of circle ="<<p;
   }  };  int main()  {
Circle              c1;
c1.input();
c1.Area();
c1.Circumference
();
   return 0;
}
```

Output:

```
Enter radius of circle: 10

Area of circle =314.286
Circumference of circle =62.8571

...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No. 9

Aim: Write a program to make a class for quadratic equation and find its roots.

Code:

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

class roots {
int  a,  b,  c;
float  r1,  r2;
public:
      void getdata()
      {
          cout << "Enter value of coefficient of
x^2: ";          cin >> a;
          cout << "Enter value of coefficient of
x: ";            cin >> b;
          cout << "Enter value of coefficient of
1: ";            cin >> c;
      }
    int determinant()
      {
        int  d  =  b  *  b;
d  -=  (4  *  a  *  c);
return d;
      }
  void checkdeterminant(int d)
      {

          if (d == 0)
```

```
        {
           cout << "Real and equal
roots\n";                       r1 = (-1 *
b);                     r1 /= (2 * a);
          r2 = r1;
               cout << "Roots : " << r1 << " and " << r2 << endl;
        }
         else if (d > 0)
        {
                    cout << "Real and distinct
roots\n";                       r1 = (-1 * b) +
sqrt(d);                r1 /= (2 * a);
r2 = (-1 * b) - sqrt(d);                r2 /= (2 *
a);
               cout << "Roots : " << r1 << " and " << r2 << endl;
          }
else
        {
       cout << "Imaginary roots" << endl << endl;
r1 = (-b)/(2*a);        r2 = (sqrt(-d))/(2*a);
                    cout << "Roots : " << r1 << " + i" << r2 ;
          cout << " and " << r1 << " - i" << r2 << endl<<endl;
        }
     }
};

int main()
{
   roots r;

 r.getdata();   cout  <<
endl;        int    d    =
r.determinant();
r.checkdeterminant(d
);
   cout << endl;

   return 0;
}
```

Output:

Output

```
/tmp/RRlamJx9Y6.o
Enter value of coefficient of x^2: 5
Enter value of coefficient of x: -2
Enter value of coefficient of 1: -9
Real and distinct roots
Roots : 1.55647 and -1.15647
```