भारतीय सूचना प्रौद्योगिकी संस्थान, पुणे

Indian Institute of Information Technology, Pune

(An Autonomous Institute of National Importance under act of Parliament)

Assignment 3

OOPL-LAB, B.Tech II Semester, 2022, IIIT Pune

GROUP 19:

Team Members:

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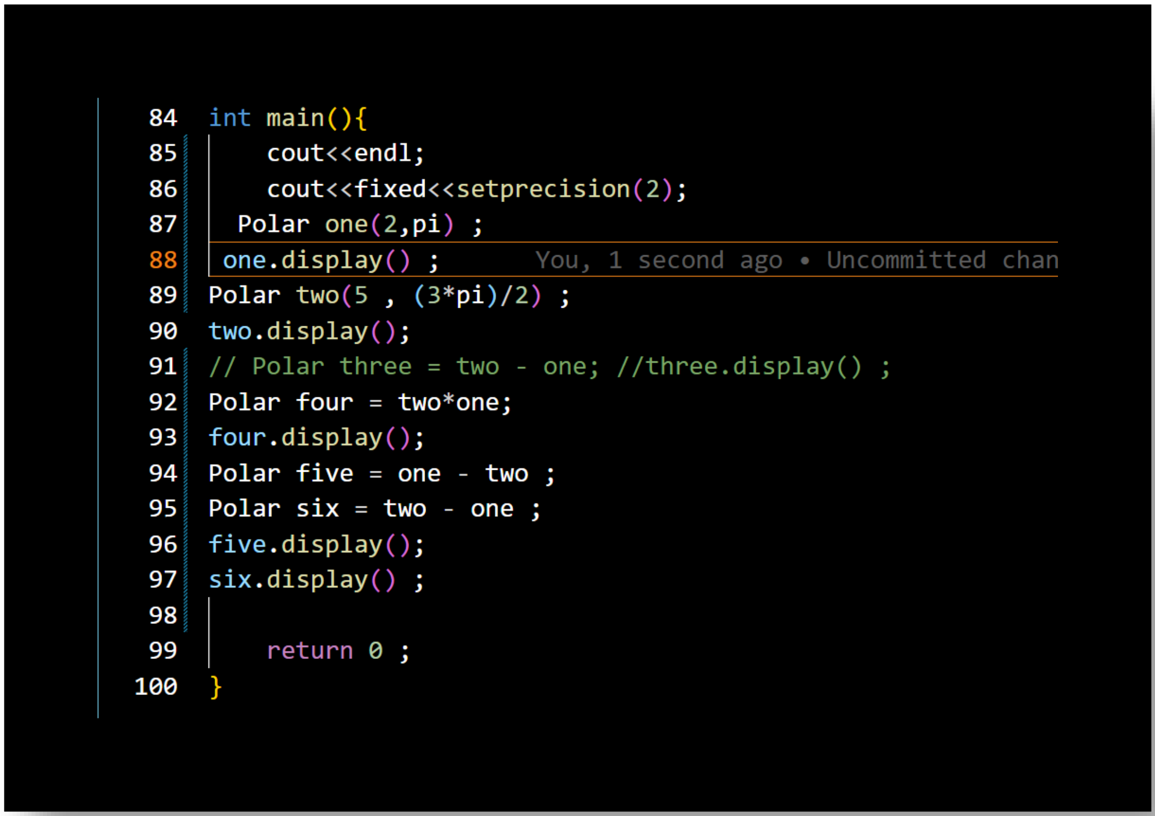
GitHub Repo Link:

Click on this link to see code

https://github.com/SomSingh23/Object-Oriented-Lab3

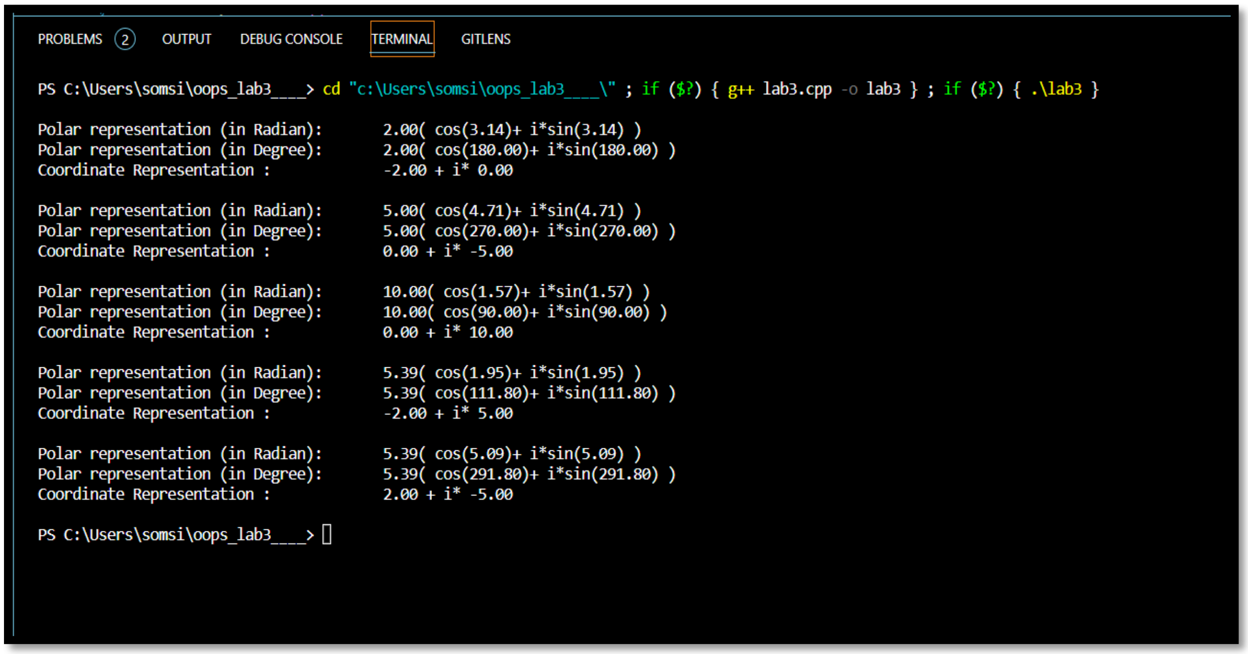
Input:



```
int main(){
    cout<<endl;
    cout<<fixed<<setprecision(2);
  Polar one(2,pi) ;
 one.display() ;       You, 1 second ago • Uncommitted chan
Polar two(5 , (3*pi)/2) ;
two.display();
// Polar three = two - one; //three.display() ;
Polar four = two*one;
four.display();
Polar five = one - two ;
Polar six = two - one ;
five.display();
six.display() ;

    return 0 ;
}
```

Output:



```
PS C:\Users\somsi\oops_lab3____> cd "c:\Users\somsi\oops_lab3____\" ; if ($?) { g++ lab3.cpp -o lab3 } ; if ($?) { .\lab3 }

Polar representation (in Radian):      2.00( cos(3.14)+ i*sin(3.14) )
Polar representation (in Degree):      2.00( cos(180.00)+ i*sin(180.00) )
Coordinate Representation :            -2.00 + i* 0.00

Polar representation (in Radian):      5.00( cos(4.71)+ i*sin(4.71) )
Polar representation (in Degree):      5.00( cos(270.00)+ i*sin(270.00) )
Coordinate Representation :            0.00 + i* -5.00

Polar representation (in Radian):      10.00( cos(1.57)+ i*sin(1.57) )
Polar representation (in Degree):      10.00( cos(90.00)+ i*sin(90.00) )
Coordinate Representation :            0.00 + i* 10.00

Polar representation (in Radian):      5.39( cos(1.95)+ i*sin(1.95) )
Polar representation (in Degree):      5.39( cos(111.80)+ i*sin(111.80) )
Coordinate Representation :            -2.00 + i* 5.00

Polar representation (in Radian):      5.39( cos(5.09)+ i*sin(5.09) )
Polar representation (in Degree):      5.39( cos(291.80)+ i*sin(291.80) )
Coordinate Representation :            2.00 + i* -5.00

PS C:\Users\somsi\oops_lab3____> 
```

C++ Code:

```
#include <bits/stdc++.h>

using namespace std ;
```

```
const double pi = acos(-1); // use pi instead of 3.14


class Polar{ // class declare here
private:
double x ; // real
double y ; // imaginary
double r ;
double theta ;
public:
// only one constructor
Polar(double radius , double radian){
r = radius ;
if(radian == pi/2)
{  x = 0;
  y = radius;
  theta = radian; }
  else if(radian == 0){ x= radius ; y=0;theta = radian;}
  else if(radian == (3*pi)/2){
     y= -1*radius ;
      x = 0 ; theta = radian;


  }
  else if(radian ==pi){ y=0 ; x=-1*radius ;theta = radian;}
  else if(radian==2*pi){ y=0; x = radius ;theta = radian; }
  else {
      x = radius*(cos(radian));theta = radian;
      y = radius*(sin(radian)); //cout<<"else called out"<<endl;
  }
}
// display funtion to display polar representation
void display(){
    cout<<"Polar representation (in Radian):"<<'\t'; cout<<r<<"( cos"<<"("<<theta<<")"<<"+ 
i*sin("<<theta<<") )"<<endl;

   cout<<"Polar representation (in Degree):"<<'\t'; cout<<r<<"( cos"<<"("<<(theta*180)/pi<<")"<<"+ 
i*sin("<<(theta*180)/pi<<") )"<<endl;

         cout<<"Coordinate Representation :"<<'\t'<<'\t';  cout<<x<<" + i* "<<y<<endl;

  cout<<endl;

}

// operator *

Polar operator*(Polar &obj1); // prototype declared here its not a friend function

friend Polar operator-(Polar &obj1 , Polar &obj2) ; // prototype of friend function to implement - overator for two 
polar number

~Polar(){/* destructor is declared here */ }

};

// outside class represention of operator overloading

Polar Polar::operator*(Polar &obj1){

double xx = x*obj1.x ;

double yy = y*obj1.y ;

double fx = -yy+xx ;

double ixx = x*obj1.y;

double iyy = y*obj1.x ;

double fy = ixx+iyy ;

double radius2 = (fx*fx + fy*fy) ;

double radius = pow(radius2 , 0.5) ;

double rad = atan(abs(fy/fx)) ;

// cout<<radius<<" "<<rad<<endl;

if(fy>=0 and fx>=0){rad = rad; }

else if(fy<=0 and fx<=0){rad =  pi + rad; }

else if(fy>=0 and fx<=0){rad = pi -  rad; }

else if(fy<=0 and fx>=0){rad = 2*pi - rad; }


Polar crazyxyz(radius , rad) ;

return crazyxyz ;
```

```
}
// friend function body
Polar operator -(Polar &obj1 , Polar &obj2){
   // cout<<obj1.x<<" "<<obj1.y<<endl;
   // cout<<obj2.x<<" "<<obj2.y<<endl;
    double xx = obj1.x + (-1*obj2.x) ;
    double yy = obj1.y + ( -1*obj2.y );
  // cout<<xx<<" "<<yy<<endl;

    double radius2 = (xx*xx + yy*yy) ;
double radius = pow(radius2 , 0.5) ;
double rad = atan(abs(yy/xx)) ;
// cout<<radius<<" "<<rad<<endl;
if(yy>=0 and xx>=0){rad = rad; }
else if(yy<=0 and xx<=0){rad =  pi + rad; }
else if(yy>=0 and xx<=0){rad = pi -  rad; }
else if(yy<=0 and xx>=0){rad = 2*pi - rad; }
Polar xyz(radius , rad) ;
return xyz;
}
int main(){
    cout<<endl;
    cout<<fixed<<setprecision(2);
  Polar one(2,pi) ;
one.display() ;
Polar two(5 , (3*pi)/2) ;
two.display();
// Polar three = two - one; //three.display() ;
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four.display();
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Polar six = two - one ;
```

```
five.display();
six.display() ;

    return 0 ;
}
```