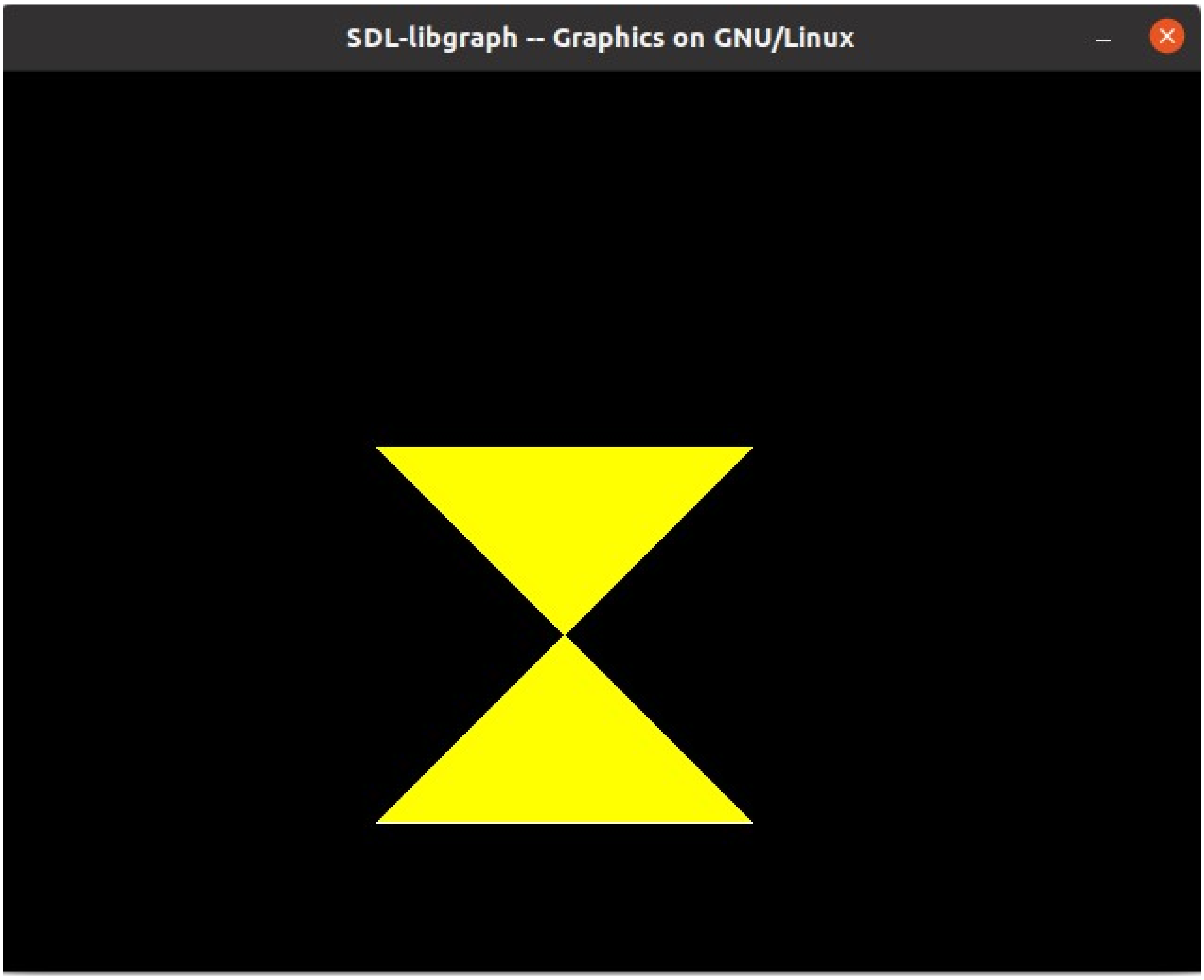
# Practical No. 1

```
#include<iostream>
#include<graphics.h>//graphics.h library is used to include  graphical operations in a program.
#include<math.h>
using namespace std;

class scan
{
   public:
   int x[20],y[20],k;
   float slope[20],x_int[20];
   void polygon(int n);
};

void scan::polygon(int n)
{
   int i;
   float dx,dy;

   x[n]=x[0];
   y[n]=y[0];
   for(int i=0;i<n;i++)  //draw all lines (edges of polygon)
   {

         line(x[i],y[i],x[i+1],y[i+1]);  // line cordinates x1,y1,x2,y2
   }

   for(i=0;i<n;i++)   // finding slope of all lines
   {
      dy=y[i+1]-y[i];  // dy=y2-y1
      dx=x[i+1]-x[i];  // dx=x2-x1
      if(dy==0)
      slope[i]=1;
      else if(dx==0)
      slope[i]=0;
      else
      slope[i]=dx/dy;
   }
      // finding intersection points
   for(int p=0;p<480;p++)  // consider 480 horizontal lines on screen
   {
      k=0;
      for(i=0;i<n;i++)
      {
         if(( (y[i]<=p) && (y[i+1]>p)) || ((y[i]>p) && (y[i+1]<=p) ))
          {
             x_int[k]=x[i]+slope[i]*(p-y[i]);       // find out intersection points using formula
             k++;
          }
       }
```

```
        for(int j=0;j<k-1;j++)   // perform sorting of intersection points on x direction
        {
           for(int i=0;i<k-1;i++)
           {
              if(x_int[i]>x_int[i+1])
              {
                 int temp = x_int[i];
                 x_int[i] = x_int[i+1];
                 x_int[i+1] = temp;
              }
           }
        }


        for(int i=0;i<k;i=i+2)   //fill points of line that are interior to polygon
        {
            setcolor(YELLOW);

           line(x_int[i], p ,x_int[i+1], p);  // x1,y1,x2,y2
           delay(10);
        }

        }
  }
       int main()
  {
     int n,i;
     scan p;
     cout<<"Enter edge : \t";
     cin>>n;
     cout<<"\n\nEnter Coordinates : \t";
     for(i=0;i<n;i++)
     {
        cin>>p.x[i]>>p.y[i];
     }
     int gd,gm;
     gd=DETECT;
     initgraph(&gd,&gm,NULL);

     p.polygon(n);
     getch();
       closegraph();
   return 0;
}
```

**Output:**



SDL-libgraph -- Graphics on GNU/Linux

**Code :**

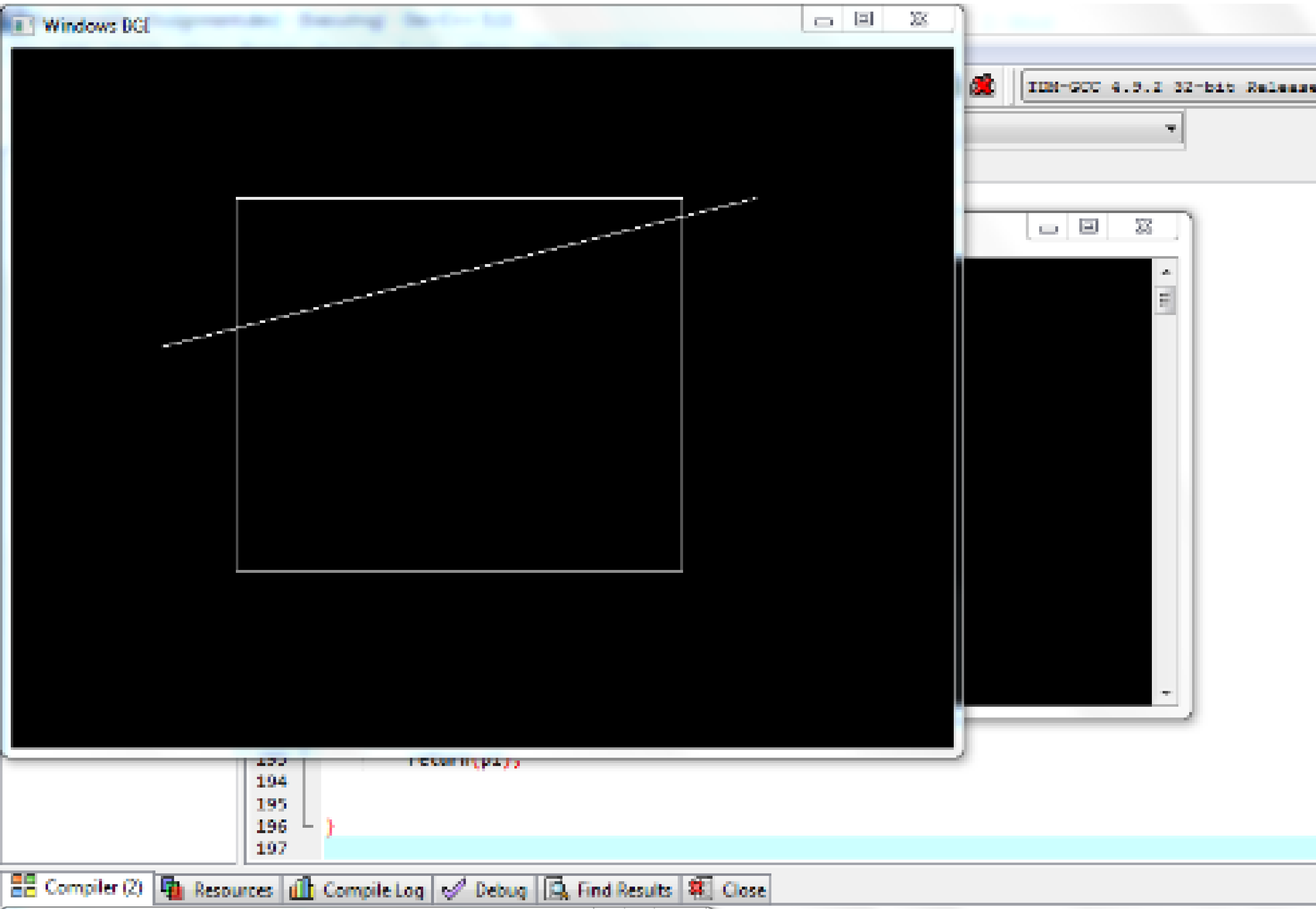
```
#include<iostream>
#include<stdlib.h>
#include<math.h>
#include<graphics.h>
#include<dos.h>
using namespace std;
class Coordinate
{
        public:
        int x,y;
        char code[4];
};
class Lineclip
{
public:
Coordinate PT;
void drawwindow();
void drawline(Coordinate p1,Coordinate p2);
Coordinate setcode(Coordinate p);
int visibility(Coordinate p1,Coordinate p2);
                Coordinate
resetendpt(Coordinate p1,Coordinate p2);
};
int main()
{
        Lineclip lc;
        int gd = DETECT,v,gm;
        Coordinate p1,p2,p3,p4,ptemp;
        cout<<"\n Enter x1 and y1\n";
        cin>>p1.x>>p1.y;
        cout<<"\n Enter x2 and y2\n";
        cin>>p2.x>>p2.y;
        initgraph(&gd,&gm,"");
        lc.drawwindow();
        delay(2000);
        lc.drawline (p1,p2);
        delay(2000);
        cleardevice();

        delay(2000);
        p1=lc.setcode(p1);
        p2=lc.setcode(p2);
        v=lc.visibility(p1,p2);
        delay(2000);

        switch(v)
        {
                case 0: lc.drawwindow();
                                delay(2000);
                                lc.drawline(p1,p2);
                                break;
           case 1:lc.drawwindow();
                delay(2000);
                break;
           case 2:p3=lc.resetendpt(p1,p2);
                  p4=lc.resetendpt(p2,p1);
                  lc.drawwindow();
                                delay(2000);
                                lc.drawline(p3,p4);
                                break;
   }
    delay(2000);
    closegraph();
 }
 void Lineclip::drawwindow()
 {
        line(150,100,450,100);
        line(450,100,450,350);
        line(450,350,150,350);
        line(150,350,150,100);
        }
 void Lineclip::drawline(Coordinate
p1,Coordinate p2)
 {
        line(p1.x,p1.y,p2.x,p2.y);
 }

Coordinate Lineclip::setcode(Coordinate p)
{
        Coordinate ptemp;
        if(p.y<100)
           ptemp.code[0]='1';
        else
           ptemp.code[0]='0';

        if(p.y>350)
                ptemp.code[1]='1';
        else
                ptemp.code[1]='0';


        if(p.x>450)
                ptemp.code[2]='1';
        else
                ptemp.code[2]='0';

        if(p.x<150)
                ptemp.code[3]='1';
        else
                ptemp.code[3]='0';

        ptemp.x=p.x;
        ptemp.y=p.y;

        return(ptemp);
};

int Lineclip:: visibility(Coordinate p1,Coordinate
p2)
{
        int i,flag=0;

        for(i=0;i<4;i++)
        {
        if(p1.code[i]!='0' || (p2.code[i]=='1'))
        flag='0';
        }

        if(flag==0)
         return(0);

        for(i=0;i<4;i++)
        {
        if(p1.code[i]==p2.code[i] &&
(p2.code[i]=='1'))
                 flag='0';
        }

        if(flag==0)
        return(1);
        return(2);
}
Coordinate Lineclip::resetendpt(Coordinate
p1,Coordinate p2)
{
        Coordinate temp;
        int x,y,i;
        float m,k;


if(p1.code[3]=='1')
        x=150;
if(p1.code[2]=='1')
        x=450;
if((p1.code[3]=='1') || (p1.code[2])=='1')
        {
        m=(float)(p2.y-p1.y)/(p2.x-p1.x);
                k=(p1.y+(m*(x-p1.x)));
                temp.y=k;
                temp.x=x;

                for(i=0;i<4;i++)
                 temp.code[i]=p1.code[i];

           if(temp.y<=350 && temp.y>=100)
                return (temp);
        }
if(p1.code[0]=='1')
                y=100;
if(p1.code[1]=='1')
                y=350;
if((p1.code[1]=='1') || (p1.code[1]=='1'))
        {
        m=(float)(p2.y-p1.y)/(p2.x-p1.x);
        k=(float)p1.x+(float)(y-p1.y)/m;
                temp.x=k;
                temp.y=y;

                for(i=0;i<4;i++)
                temp.code[i]=p1.code[i];

                return(temp);
        }
        else
                return(p1);
        }
```

**Input :**

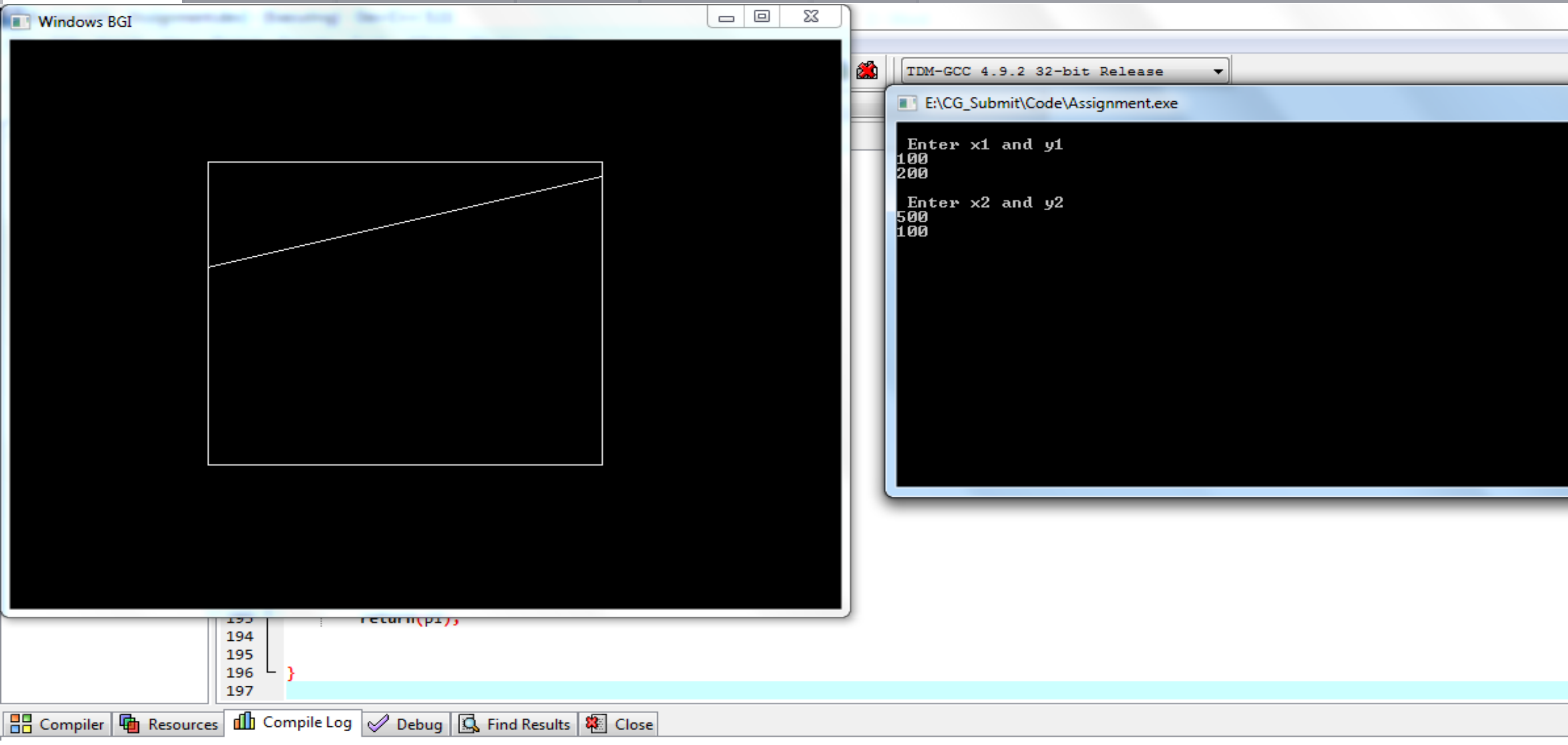
```
X1 , Y1:
100
200

X2, Y2 :
500
100
```

**Output :**

+++



```
        return(p1);

}
```



```
 Enter x1 and y1
100
200

 Enter x2 and y2
500
100
```

```
        return(p1);

}
```

**Code :**

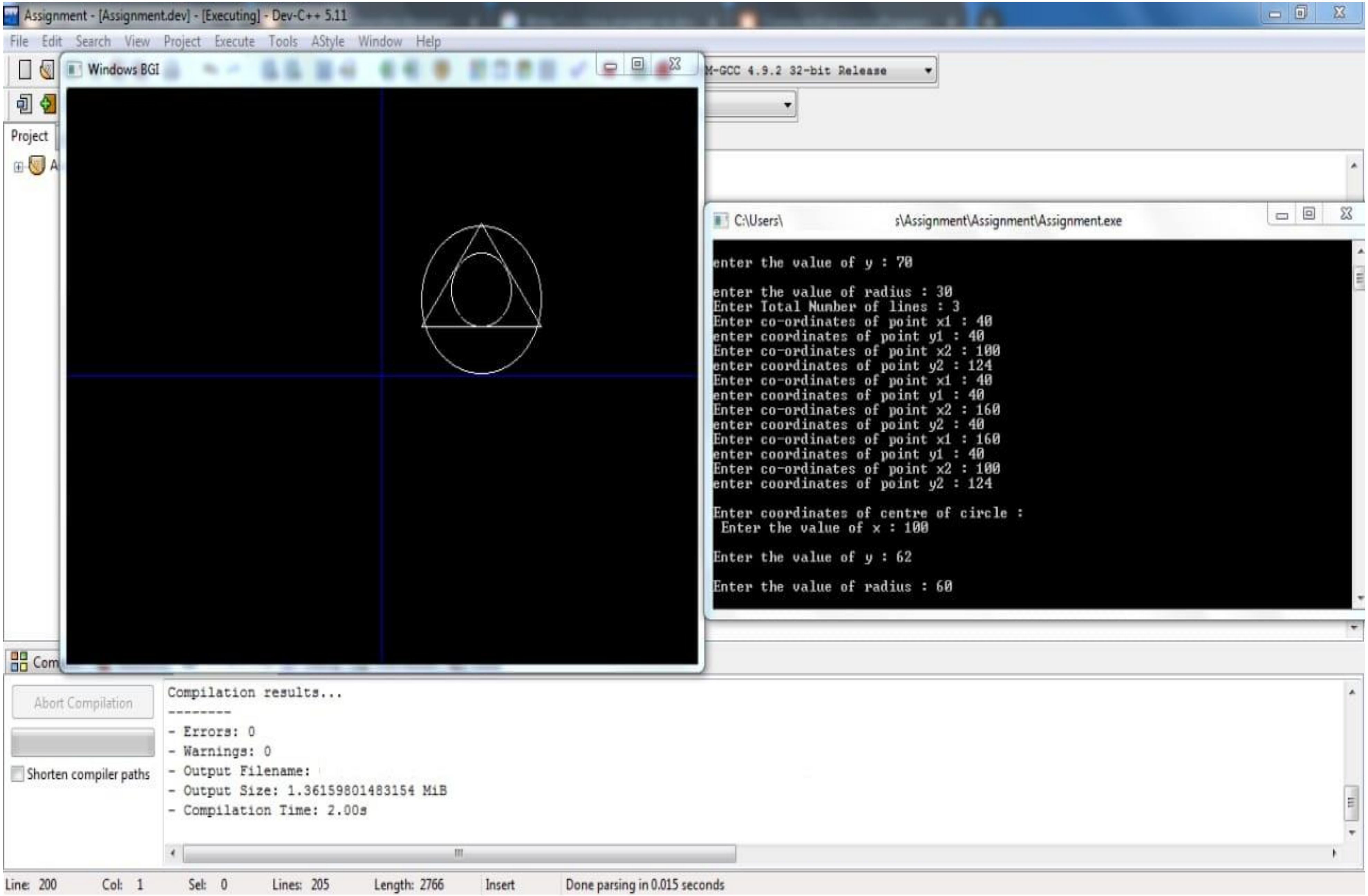
```
#include <iostream>
# include <graphics.h>
# include <stdlib.h>
using namespace std;
class dcircle
{
private: int x0, y0;
public:
dcircle()
{
x0=0;
y0=0;
}
void setoff(int xx, int yy)
{
x0=xx;
y0=yy;
}
void drawc(int x1, int y1, int r)
{
float d;
int x,y;
x=0;
y=r;
d=3-2*r;
do
{
putpixel(x1+x0+x, y0+y-y1, 15);
putpixel(x1+x0+y, y0+x-y1,15);
putpixel(x1+x0+y, y0-x-y1,15);
putpixel(x1+x0+x,y0-y-y1,15);
putpixel(x1+x0-x,y0-y-y1,15);
putpixel(x1+x0-y, y0-x-y1,15);
putpixel(x1+x0-y, y0+x-y1,15);
putpixel(x1+x0-x, y0+y-y1,15);
if (d<=0)
{
d = d+4*x+6;
}
else
{
d=d+4*(x-y)+10;
y=y-1;
}
x=x+1;
}
while(x<y);
}
};
class pt
{
protected: int xco, yco,color;
public:
pt()
{
xco=0,yco=0,color=15;
}
void setco(int x, int y)
{
xco=x;
yco=y;
}
void setcolor(int c)
{
color=c;
}
void draw()
{
putpixel(xco,yco,color);
}
};
class dline:public pt
{
private: int x2, y2;
public:
dline():pt()
{
x2=0;
y2=0;
}
void setline(int x, int y, int xx, int yy)
{
pt::setco(x,y);
x2=xx;
y2=yy;
}
void drawl( int colour)
{
float x,y,dx,dy,length;
int i;
pt::setcolor(colour);
dx= abs(x2-xco);
dy=abs(y2-yco);
if(dx>=dy)
{
length= dx;
}
else
{
length= dy;
}
dx=(x2-xco)/length;
dy=(y2-yco)/length;
x=xco+0.5;
y=yco+0.5;
i=1;
while(i<=length)
{
pt::setco(x,y);
pt::draw();
x=x+dx;
y=y+dy;
i=i+1;
}
pt::setco(x,y);
pt::draw();
}
};
int main()
{
int gd=DETECT, gm;
initgraph(&gd, &gm, NULL);
int x,y,r, x1, x2, y1, y2, xmax, ymax, xmid, ymid,
n, i;
dcircle c;
cout<<"\nenter coordinates of centre of circle :
";
cout<<"\n enter the value of x : ";
cin>>x;
cout<<"\nenter the value of y : ";
cin>>y;
cout<<"\nenter the value of radius : ";
cin>>r;
xmax= getmaxx();
ymax=getmaxy();
xmid=xmax/2;
ymid=ymax/2;
setcolor(1);
c.setoff(xmid,ymid);
line(xmid, 0, xmid, ymax);
line(0,ymid,xmax,ymid);
setcolor(15);
c.drawc(x,y,r);
pt p1;
p1.setco(100,100);
p1.setcolor(14);
dline l;
l.setline(x1+xmid, ymid-y1, x2+xmid, ymid-y2);
cout<<"Enter Total Number of lines : ";
cin>>n;
for(i=0;i<n;i++)
{
cout<<"Enter co-ordinates of point x1 : ";
cin>>x1;
cout<<"enter coordinates of point y1 : ";
cin>>y1;
cout<<"Enter co-ordinates of point x2 : ";
cin>>x2;
cout<<"enter coordinates of point y2 : ";
cin>>y2;
l.setline(x1+xmid, ymid-y1, x2+xmid, ymid-y2);
l.drawl(15);
}
cout<<"\nEnter coordinates of centre of circle :
";
cout<<"\n Enter the value of x : ";
cin>>x;
cout<<"\nEnter the value of y : ";
cin>>y;
cout<<"\nEnter the value of radius : ";
cin>>r;
setcolor(5);
c.drawc(x,y,r);
getch();
delay(200);
closegraph();
return 0;
}
```

**Input :**

```
Value Of X : 100
Value Of Y : 70
Value Of R : 30
```

Next Inputs In Image Given Below.

**Output :**


Assignment - [Assignment.dev] - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
Windows BGI
M-GCC 4.9.2 32-bit Release
Project
C:\Users\ s\Assignment\Assignment\Assignment.exe
Abort Compilation
□ Shorten compiler paths
Line: 200 Col: 1 Sel: 0 Lines: 205 Length: 2766 Insert Done parsing in 0.015 seconds

```
enter the value of y : 70

enter the value of radius : 30
Enter Total Number of lines : 3
Enter co-ordinates of point x1 : 40
enter coordinates of point y1 : 40
Enter co-ordinates of point x2 : 100
enter coordinates of point y2 : 124
Enter co-ordinates of point x1 : 40
enter coordinates of point y1 : 40
Enter co-ordinates of point x2 : 160
enter coordinates of point y2 : 40
Enter co-ordinates of point x1 : 160
enter coordinates of point y1 : 40
Enter co-ordinates of point x2 : 100
enter coordinates of point y2 : 124

Enter coordinates of centre of circle :
 Enter the value of x : 100

Enter the value of y : 62

Enter the value of radius : 60
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename:
- Output Size: 1.36159801483154 MiB
- Compilation Time: 2.00s
```

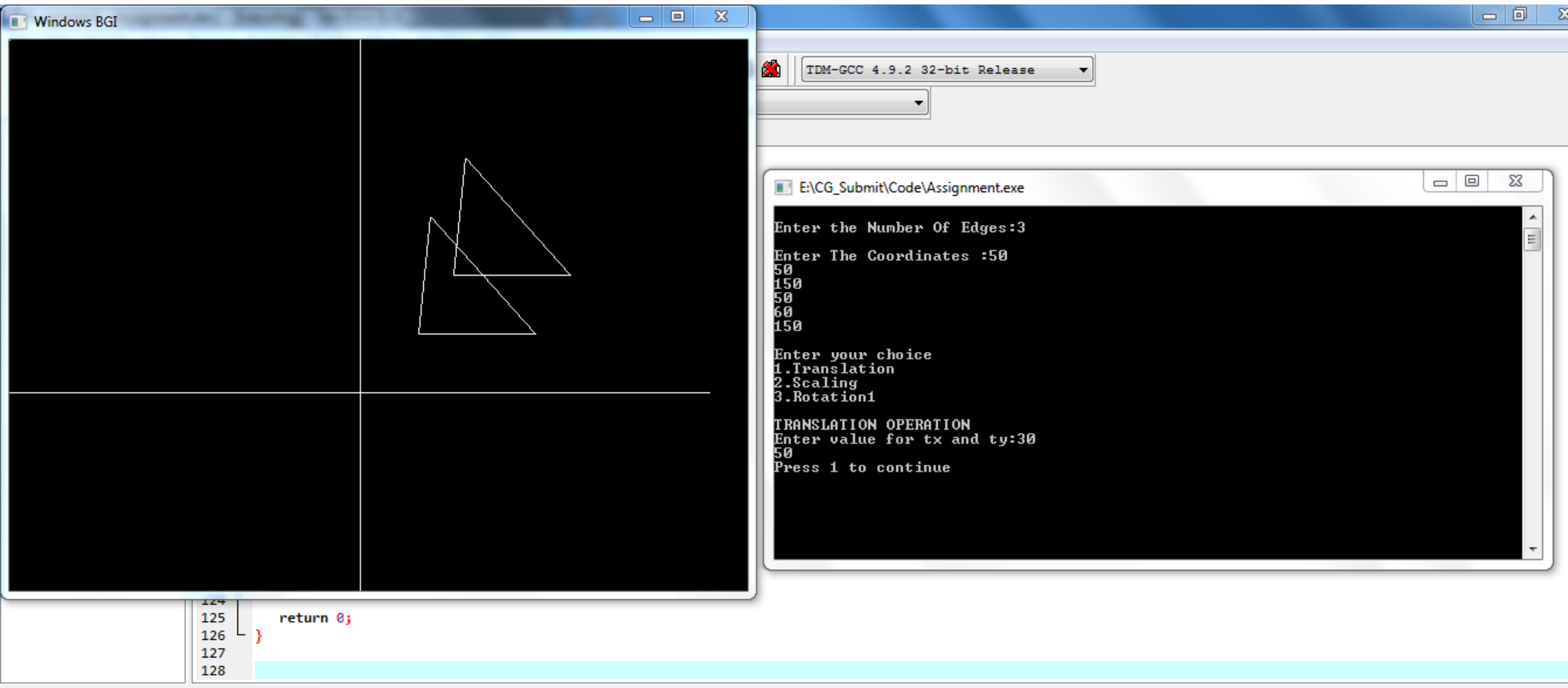
**Code :**

```
#include<iostream>
#include<graphics.h>
#include<math.h>
using namespace std;
class transform
{
public:
                int m,a[20][20],c[20][20];
                int i,j,k;
public:
                void object();
                void accept();
                void operator *(float b[20][20])
                {
                    for(int i=0;i<m;i++)
                        {
                                 for(int j=0;j<m;j++)
                                     {
                                         c[i][j]=0;
                                              for(int k=0;k<m;k++)
                                                                                              {
                                c[i][j]=c[i][j]+(a[i][k]*b[k][j]);
                                                                              }
                                                              }
                                              }
                                }
};
void transform::object()
{
                 int gd,gm;
                gd=DETECT;
                initgraph(&gd,&gm,NULL);
   line(300,0,300,600);
   line(0,300,600,300);
    for( i=0;i<m-1;i++)
    {
                line(300+a[i][0],300-a[i][1],300+a[i+1][0],300-a[i+1][1]);
                }
                line(300+a[0][0],300-a[0][1],300+a[i][0],300-a[i][1]);
                for( i=0;i<m-1;i++)
                {
                                line(300+c[i][0],300-c[i][1],300+c[i+1][0],300-
c[i+1][1]);
                }
                line(300+c[0][0],300-c[0][1],300+c[i][0],300-c[i][1]);
                int temp;
                cout << "Press 1 to continue";
                cin >> temp;
                closegraph();
}
void transform::accept()
{
cout<<"\n";
 cout<<"Enter the Number Of Edges:";
    cin>>m;
    cout<<"\nEnter The Coordinates :";
    for(int i=0;i<m;i++)
    {
                for(int j=0;j<3;j++)
                {
                                if(j>=2)
                                a[i][j]=1;
                                else
                                cin>>a[i][j];
                                }
                }
}
int main()
{
int ch,tx,ty,sx,sy;
float deg,theta,b[20][20];
transform t;
t.accept();
   cout<<"\nEnter your choice";
    cout<<"\n1.Translation"
                                 "\n2.Scaling"
                                                  "\n3.Rotation";
                                                  cin>>ch;
switch(ch)
{
case 1: cout<<"\nTRANSLATION OPERATION\n";
                cout<<"Enter value for tx and ty:";
             cin>>tx>>ty;
                   b[0][0]=b[2][2]=b[1][1]=1;
                b[0][1]=b[0][2]=b[1][0]=b[1][2]=0;
                                                          b[2][0]=tx;
                                                          b[2][1]=ty;
                                                          t * b;
                                                          t.object();
                                                          break;

                    case 2: cout<<"\nSCALING OPERATION\n";
                                        cout<<"Enter value for sx,sy:";
                                        cin>>sx>>sy;
                                        b[0][0]=sx;
                                        b[1][1]=sy;
                                        b[0][1]=b[0][2]=b[1][0]=b[1][2]=0;
                                        b[2][0]=b[2][1]=0;
                                                          b[2][2] = 1;
                                                          t * b;
                                                          t.object();
                                                          break;
                                case 3: cout<<"\nROTATION OPERATION\n";
                                        cout<<"Enter value for angle:";
                                        cin>>deg;
                                                          theta=deg*(3.14/100);
                                                          b[0][0]=b[1][1]=cos(theta);
                                                          b[0][1]=sin(theta);
                                                          b[1][0]=sin(-theta);

                b[0][2]=b[1][2]=b[2][0]=b[2][1]=0;
                                                          b[2][2]=1;
                                                          t * b;
                                                          t.object();
                                                          break;
                                default:
                                    cout<<"\nInvalid choice";

                                }

   getch();

   return 0;
}
```

**Input :**

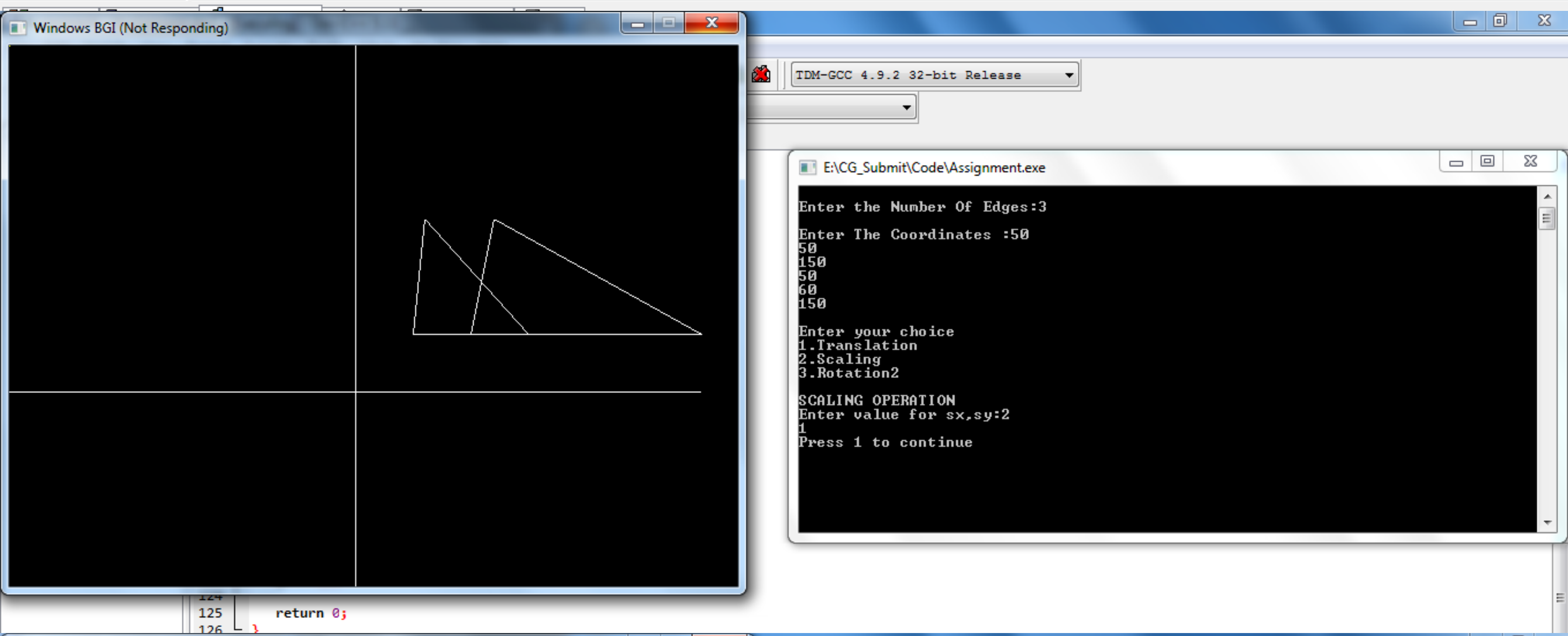
Provided In Image Given Below

**Output :**


Windows BGI
TDM-GCC 4.9.2 32-bit Release
E:\CG_Submit\Code\Assignment.exe

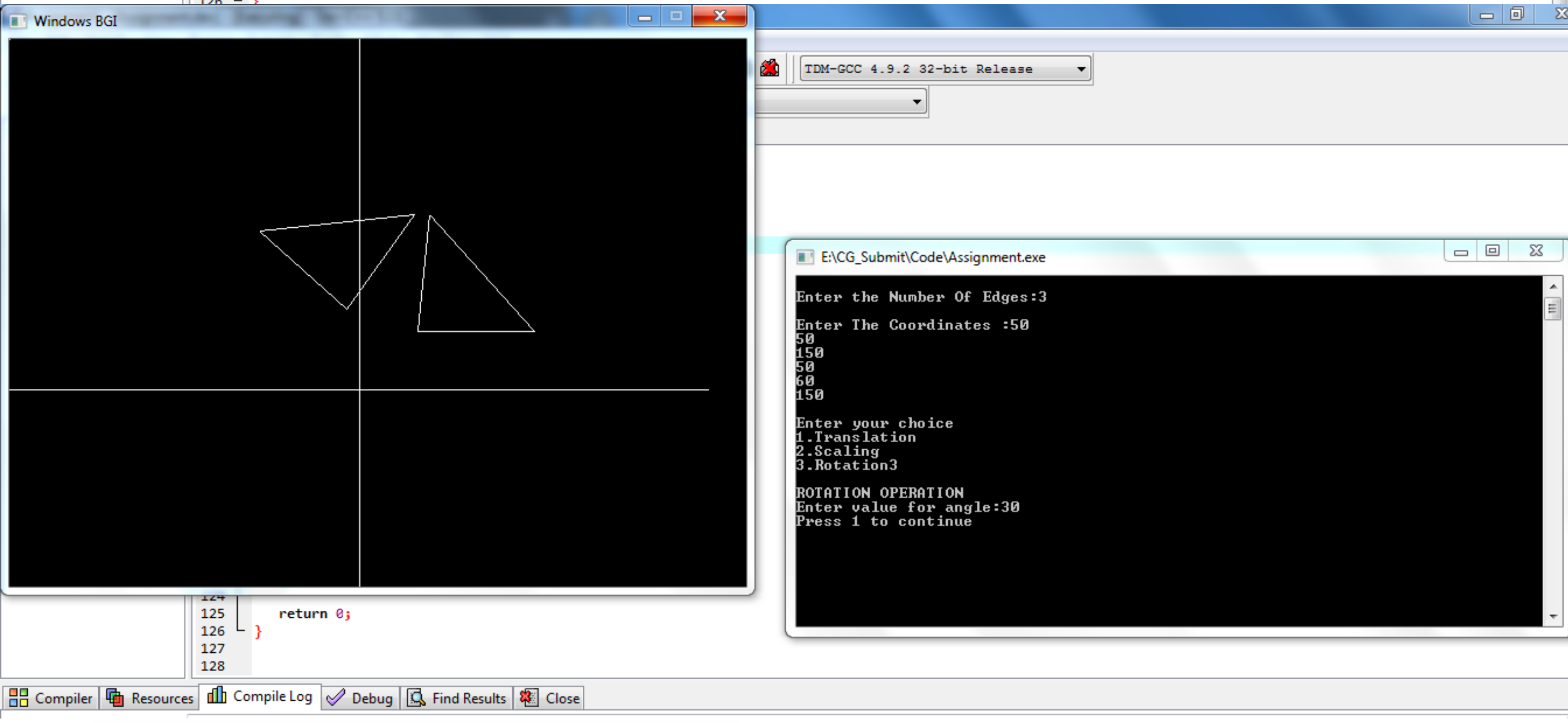
```
Enter the Number Of Edges:3

Enter The Coordinates :50
50
150
50
60
150

Enter your choice
1.Translation
2.Scaling
3.Rotation1

TRANSLATION OPERATION
Enter value for tx and ty:30
50
Press 1 to continue
```

```
    return 0;
}
```


Windows BGI (Not Responding)
TDM-GCC 4.9.2 32-bit Release
E:\CG_Submit\Code\Assignment.exe

```
Enter the Number Of Edges:3

Enter The Coordinates :50
50
150
50
60
150

Enter your choice
1.Translation
2.Scaling
3.Rotation2

SCALING OPERATION
Enter value for sx,sy:2
1
Press 1 to continue
```

```
    return 0;
```



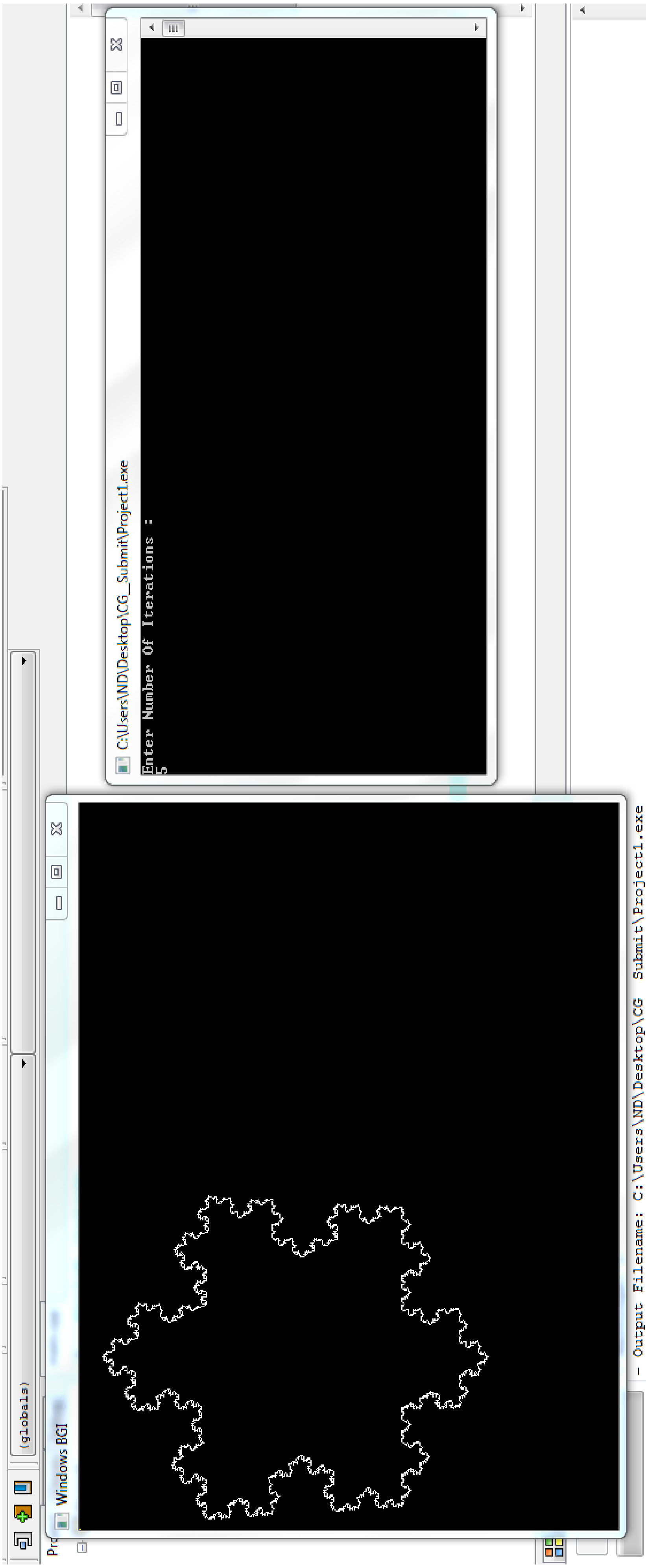
```
Enter the Number Of Edges:3

Enter The Coordinates :50
50
150
50
60
150

Enter your choice
1.Translation
2.Scaling
3.Rotation3

ROTATION OPERATION
Enter value for angle:30
Press 1 to continue
```

```
    return 0;
}
```

**Code :**

```
#include <iostream>
#include <math.h>
#include <graphics.h>
using namespace std;
class kochCurve
{
public:
void koch(int it,int x1,int y1,int x5,int y5)
{
int x2,y2,x3,y3,x4,y4;
int dx,dy;
if (it==0)
{
line(x1,y1,x5,y5);
}
else
{
delay(10);
dx=(x5-x1)/3;
dy=(y5-y1)/3;
x2=x1+dx;
y2=y1+dy;
x3=(int)(0.5*(x1+x5)+sqrt(3)*(y1-y5)/6);
y3=(int)(0.5*(y1+y5)+sqrt(3)*(x5-x1)/6);
x4=2*dx+x1;
y4=2*dy+y1;
koch(it-1,x1,y1,x2,y2);
koch(it-1,x2,y2,x3,y3);
koch(it-1,x3,y3,x4,y4);
koch(it-1,x4,y4,x5,y5);
}}
};
int main()
{
kochCurve k;
int it;
cout<<"Enter Number Of Iterations : "<<endl;
cin>>it;
int gd=DETECT,gm;
initgraph(&gd,&gm,NULL);
k.koch(it,150,20,20,280);
k.koch(it,280,280,150,20);
k.koch(it,20,280,280,280);
getch();
closegraph();
return 0;
}
```

**Output:**



```
Enter Number Of Iterations :
5
```

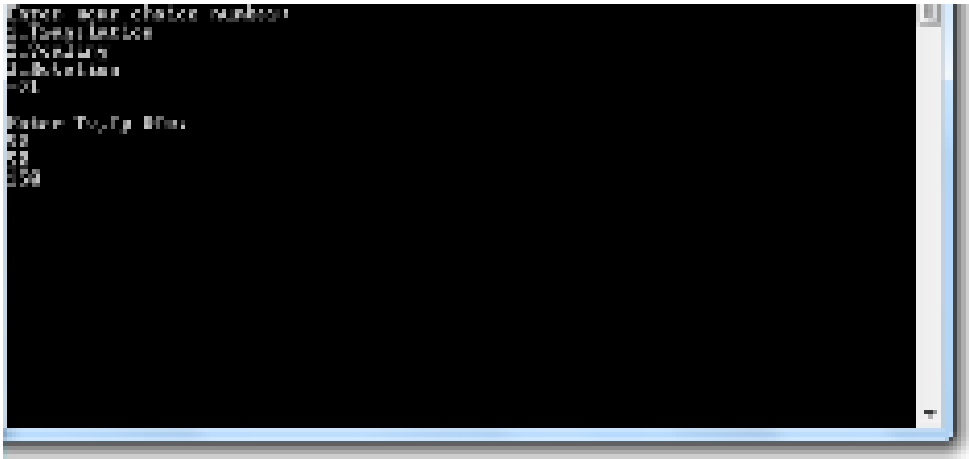
C:\Users\ND\Desktop\CG_Submit\Project1.exe
Windows BGI
(globals)
- Output Filename: C:\Users\ND\Desktop\CG_Submit\Project1.exe

**Code :**

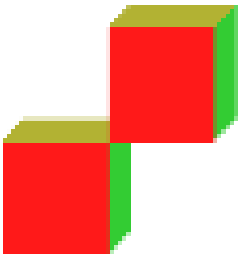
```
#include<iostream>

#include<math.h>
#include<GL/glut.h>
using namespace std;
typedef float Matrix4 [4][4];
Matrix4 theMatrix;
static GLfloat input[8][3]=
{
 {40,40,-50},{90,40,-50},{90,90,-50},{40,90,-50},
 {30,30,0},{80,30,0},{80,80,0},{30,80,0}
};
float output[8][3];
float tx,ty,tz;
float sx,sy,sz;
float angle;
int choice,choiceRot;
void setIdentityM(Matrix4 m)
{
for(int i=0;i<4;i++)
 for(int j=0;j<4;j++)
 m[i][j]=(i==j);
}
void translate(int tx,int ty,int tz)
{
for(int i=0;i<8;i++)
{
output[i][0]=input[i][0]+tx;
output[i][1]=input[i][1]+ty;
output[i][2]=input[i][2]+tz;
}
}
void scale(int sx,int sy,int sz)
{
 theMatrix[0][0]=sx;
 theMatrix[1][1]=sy;
 theMatrix[2][2]=sz;
}
void RotateX(float angle) //Parallel to x
{
angle = angle*3.142/180;
 theMatrix[1][1] = cos(angle);
theMatrix[1][2] = -sin(angle);
theMatrix[2][1] = sin(angle);
theMatrix[2][2] = cos(angle);
}
void RotateY(float angle) //parallel to y
{
angle = angle*3.14/180;
theMatrix[0][0] = cos(angle);
theMatrix[0][2] = -sin(angle);
theMatrix[2][0] = sin(angle);
theMatrix[2][2] = cos(angle);
}
void RotateZ(float angle) //parallel to z
{
angle = angle*3.14/180;
theMatrix[0][0] = cos(angle);
theMatrix[0][1] = sin(angle);
theMatrix[1][0] = -sin(angle);
theMatrix[1][1] = cos(angle);
}
void multiplyM()
{
//We Don't require 4th row and column in scaling and rotation
//[8][3]=[8][3]*[3][3] //4th not used
for(int i=0;i<8;i++)
{
 for(int j=0;j<3;j++)
 {
 output[i][j]=0;
 for(int k=0;k<3;k++)
 {
 output[i][j]=output[i][j]+input[i][k]*theMatrix[k][j];
 }
 }
}
}
void Axes(void)
{
glColor3f (0.0, 0.0, 0.0); // Set the color to BLACK
glBegin(GL_LINES); // Plotting X-Axis
glVertex2s(-1000 ,0);
glVertex2s( 1000 ,0);
glEnd();
glBegin(GL_LINES); // Plotting Y-Axis
glVertex2s(0 ,-1000);
glVertex2s(0 , 1000);
glEnd();
}
void draw(float a[8][3])
{
 glBegin(GL_QUADS);
 glColor3f(0.7,0.4,0.5); //behind
 glVertex3fv(a[0]);
 glVertex3fv(a[1]);
 glVertex3fv(a[2]);
 glVertex3fv(a[3]);
 glColor3f(0.8,0.2,0.4); //bottom
 glVertex3fv(a[0]);
 glVertex3fv(a[1]);
 glVertex3fv(a[5]);
 glVertex3fv(a[4]);
 glColor3f(0.3,0.6,0.7); //left
 glVertex3fv(a[0]);
 glVertex3fv(a[4]);
 glVertex3fv(a[7]);
 glVertex3fv(a[3]);
 glColor3f(0.2,0.8,0.2); //right
glVertex3fv(a[1]);
glVertex3fv(a[2]);
glVertex3fv(a[6]);
glVertex3fv(a[5]);
glColor3f(0.7,0.7,0.2); //up
glVertex3fv(a[2]);
glVertex3fv(a[3]);
glVertex3fv(a[7]);
glVertex3fv(a[6]);
glColor3f(1.0,0.1,0.1);
glVertex3fv(a[4]);
glVertex3fv(a[5]);
glVertex3fv(a[6]);
glVertex3fv(a[7]);
glEnd();
}
void init()
{
 glClearColor(1.0,1.0,1.0,1.0); //set backgrond color to white
 glOrtho(-454.0,454.0,-250.0,250.0,-250.0,250.0);
 // Set the no. of Co-ordinates along X & Y axes and their gappings
 glEnable(GL_DEPTH_TEST);
 // To Render the surfaces Properly according to their depths
}
void display()
{
glClear(GL_COLOR_BUFFER_BIT|GL_DEPTH_BUFFER_BIT);
Axes();
glColor3f(1.0,0.0,0.0);
draw(input);
setIdentityM(theMatrix);
switch(choice)
{
case 1:
 translate(tx,ty,tz);
 break;
case 2:
 scale(sx,sy,sz);
multiplyM();
```

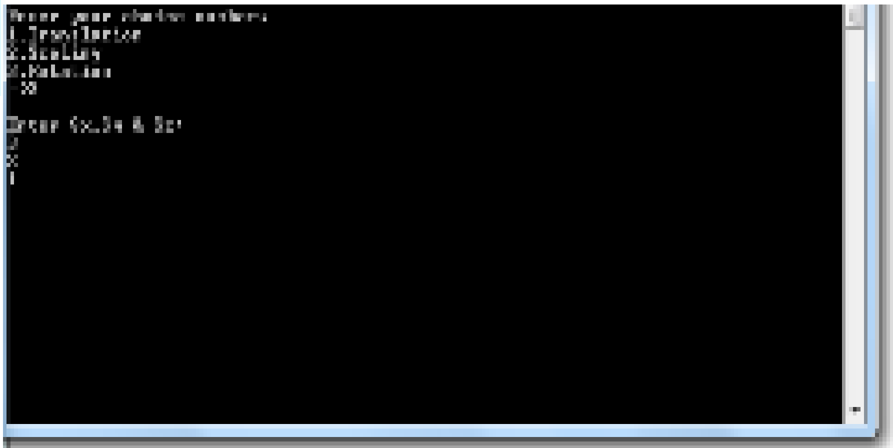
```
 break;
case 3:
 switch (choiceRot) {
 case 1:
 RotateX(angle);
 break;
 case 2: RotateY(angle);
 break;
 case 3:
 RotateZ(angle);
 break;
 default:
 break;
 }
multiplyM();
 break;
}
draw(output);
glFlush();
}
int main(int argc, char** argv)
{
 glutInit(&argc,argv);
 glutInitDisplayMode(GLUT_
SINGLE|GLUT_RGB|GLUT_
DEPTH);
 glutInitWindowSize(1362,75
0);
 glutInitWindowPosition(0,0);
 glutCreateWindow("3D
TRANSFORMATIONS");
 init();
 cout<<"Enter your choice
number:\n1.Translation\n2.S
caling\n3.Rotation\n=>";
 cin>>choice;
 switch (choice) {
 case 1:
 cout<<"\nEnter Tx,Ty &Tz:
\n";
 cin>>tx>>ty>>tz;
 break;
 case 2:
 cout<<"\nEnter Sx,Sy & Sz:
\n";
 cin>>sx>>sy>>sz;
 break;
 case 3:
 cout<<"Enter your choice for
Rotation about
axis:\n1.parallel to X-axis."
 <<"(y& z)\n2.parallel to Y-
axis.(x& z)\n3.parallel to Z-
axis."
 <<"(x& y)\n =>";
 cin>>choiceRot;
 switch (choiceRot) {
 case 1:
 cout<<"\nENter Rotation
angle: ";
 cin>>angle;
 break;
 case 2:
 cout<<"\nENter Rotation
angle: ";
 cin>>angle;
 break;
 case 3:
 cout<<"\nENter Rotation
angle: ";
 cin>>angle;
 break;
 default:
 break;
 }
 break;
 default:
 break;
 }
 glutDisplayFunc(display);
 glutMainLoop();
return 0;
}
```

**Output :**

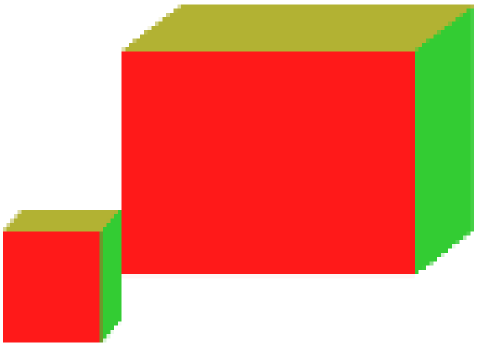


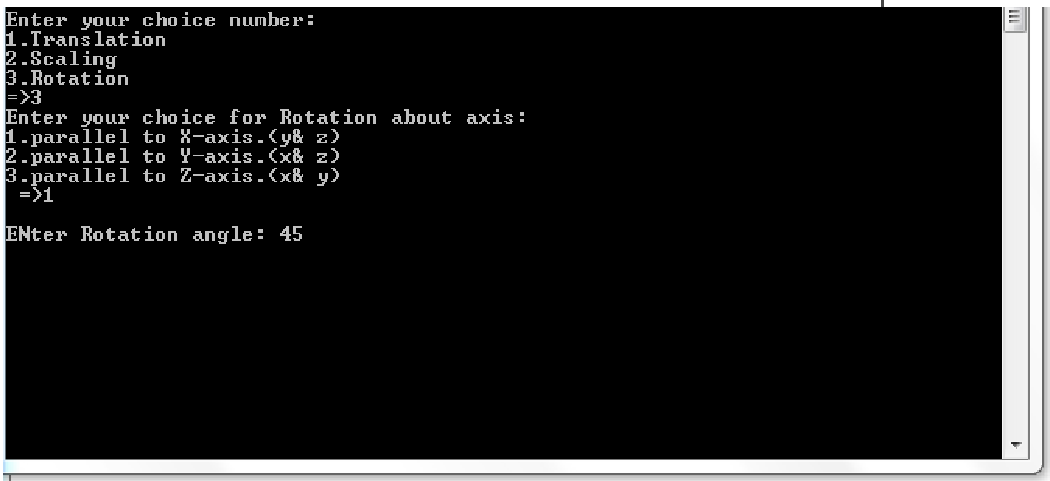
```
Enter your choice number:
1.Translation
2.Scaling
3.Rotation
=>1

Enter Tx,Ty &Tz:
20
20
150
```





```
Enter your choice number:
1.Translation
2.Scaling
3.Rotation
=>2

Enter Sx,Sy & Sz:
3
2
1
```





```
Enter your choice number:
1.Translation
2.Scaling
3.Rotation
=>3
Enter your choice for Rotation about axis:
1.parallel to X-axis.(y& z)
2.parallel to Y-axis.(x& z)
3.parallel to Z-axis.(x& y)
 =>1

ENter Rotation angle: 45
```