ABESIT

COLLEGE CODE – 290

Lab File

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SESSION	2019-20
NAME OF LAB	Computer Graphics Lab (RCS 653)

Aim :- *Write a program to implement DDA algorithms for line and circle.*

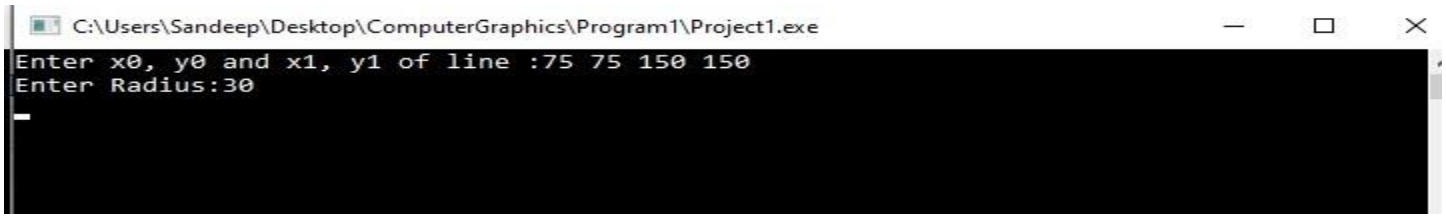
Code :-

```
#include<graphics.h>
#include<conio.h>
#include<stdio.h>
#include<math.h>

//DDA Circle Logic
void DDA_Circle()
{
   int errorcode,tmp,i=1,rds;
   float st_x,st_y,x1,x2,y1,y2,ep;
   printf("Enter Radius:");
   scanf("%d",&rds);
   while(rds>pow(2,i))
     i++;
   ep=1/pow(2,i);
   x1=rds;  y1=0;
   st_x=rds; st_y=0;
   do
   { x2=x1+(y1*ep);
     y2=y1-(x2*ep);
     putpixel(x2+200,y2+200,10);
     x1=x2;
     y1=y2;
   }while((y1-st_y)<ep || (st_x-x1)>ep);

}
```

```
// DDA Line Logic
void DDA_Line()
{
        float x, y,dx,dy,steps;
   int x0, x1, y0, y1,i;

   printf("Enter x0, y0 and x1, y1 of line :");
   scanf("%d%d%d%d",&x0,&y0,&x1,&y1);
   dx = (float)(x1 - x0);
   dy = (float)(y1 - y0);
   if(dx>=dy)
        {
      steps = dx;
   }
   else
        {
      steps = dy;
   }
   dx = dx/steps;
   dy = dy/steps;
   x = x0;
   y = y0;
   i = 1;
   while(i<= steps)
   {
      putpixel(x, y, BLUE);
      x += dx;
      y += dy;
      i=i+1;
```

```
    }
}


//**********Main Fuction**********
int main()
{
    int gd = DETECT ,gm, i;
    initgraph(&gd, &gm, "");
          DDA_Line();
    DDA_Circle();
    getch();
    closegraph();
    return 0;
}
```

Output :-



Aim :- *Write a program to implement Bresenham's algorithms for line, circle and ellipse drawing.*

Code :-

```
#include<stdio.h>
#include<graphics.h>

//**********************Bresenham's Line**********************
//Draw line using Bresenham's Line Drawing Algorithm
void Bresenham_Line()
{
   int dx, dy, p, x, y ,error, x0, y0, x1, y1;
   printf("Enter co-ordinates of first point: ");
        scanf("%d%d", &x0, &y0);
        printf("Enter co-ordinates of second point: ");
        scanf("%d%d", &x1, &y1);

        dx=x1-x0;
        dy=y1-y0;
        x=x0;
        y=y0;
        p=2*dy-dx;
        while(x<x1)
        {
                if(p>=0)
                {
                        putpixel(x,y,7);
                        y=y+1;
                        p=p+2*dy-2*dx;
```

```
            }
            else
                {
                    putpixel(x,y,7);
                    p=p+2*dy;
                }
                x=x+1;
        }
}

//**********************Bresenham's Circle**********************
//Draw Circle using Bresenham's Circle Drawing Algorithm

void drawCircle(int xc, int yc, int x, int y)
{
putpixel(xc+x, yc+y, RED);
putpixel(xc-x, yc+y, RED);
putpixel(xc+x, yc-y, RED);
putpixel(xc-x, yc-y, RED);
putpixel(xc+y, yc+x, RED);
putpixel(xc-y, yc+x, RED);
putpixel(xc+y, yc-x, RED);
putpixel(xc-y, yc-x, RED);
}
void Bresenham_Circle()
{
   int xc = 50, yc = 50, r = 30;
   int x = 0, y = r;
   int d = 3 - 2 * r;
```

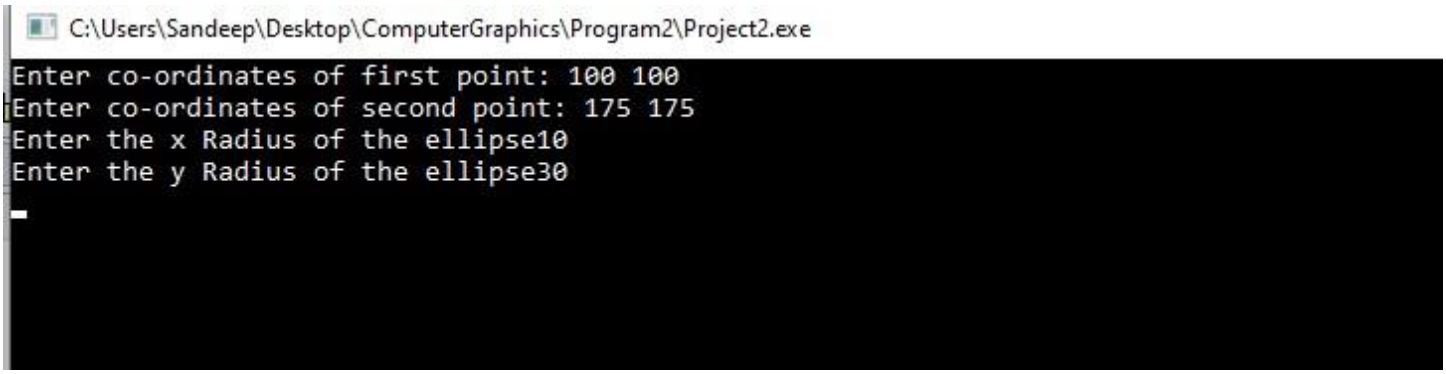
```
    drawCircle(xc, yc, x, y);
    while (y >= x)
    {
        // for each pixel we will
        // draw all eight pixels

        x++;

        // check for decision parameter
        // and correspondingly
        // update d, x, y
        if (d > 0)
        {
            y--;
            d = d + 4 * (x - y) + 10;
        }
        else
            d = d + 4 * x + 6;
        drawCircle(xc, yc, x, y);
        delay(50);
    }
}

//**********************Bresenham's Ellipse**********************
//Draw Circle using Bresenham's Ellipse Drawing Algorithm
void Bresenham_Ellipse()
{
        long int d1,d2;
        int i,x,y;
```

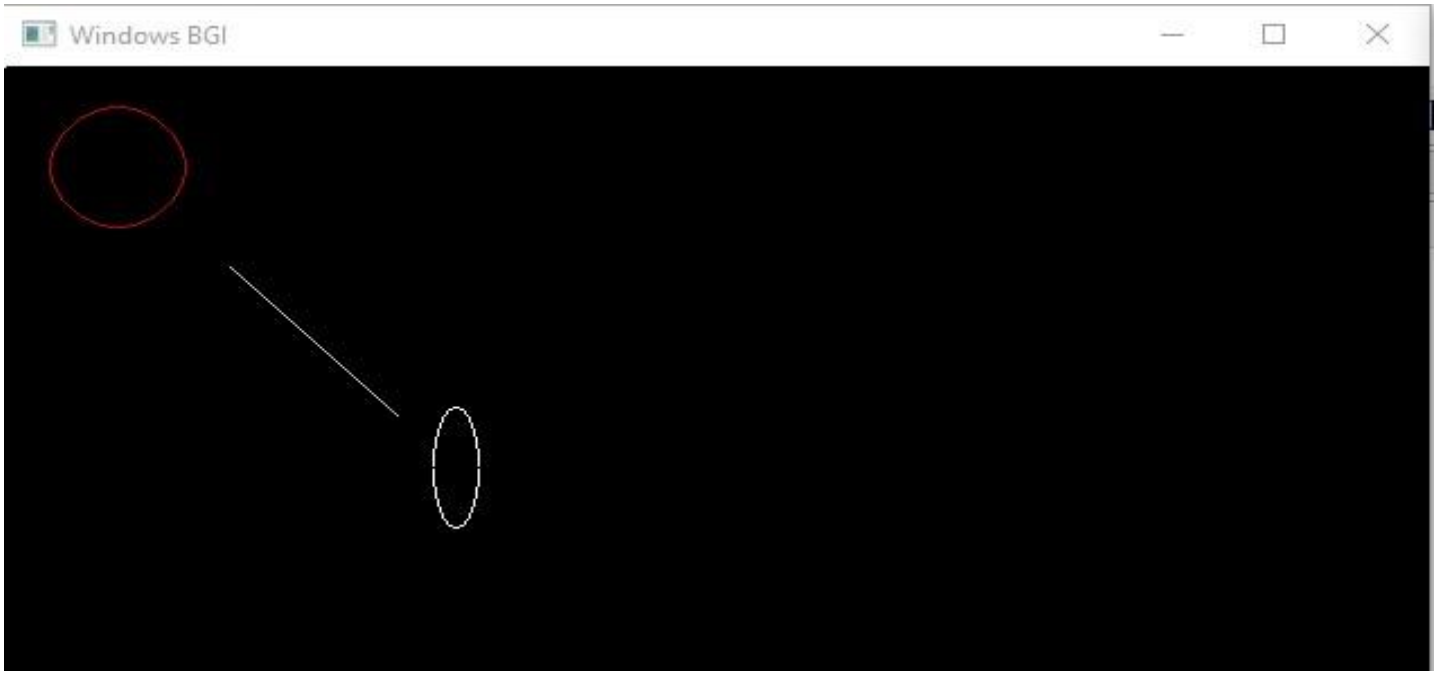
```
long int rx,ry,rxsq,rysq,tworxsq,tworysq,dx,dy;
printf("Enter the x Radius of the ellipse");
scanf("%ld",&rx);
printf("Enter the y Radius of the ellipse");
scanf("%ld",&ry);

rxsq=rx*rx;
rysq=ry*ry;
tworxsq=2*rxsq;
tworysq=2*rysq;
x=0;
y=ry;
d1=rysq - (rxsq * ry) + (0.25 * rxsq);
dx= tworysq * x;
dy= tworxsq * y;
do
{
 putpixel(200+x,200+y,15);
 putpixel(200-x,200-y,15);
 putpixel(200+x,200-y,15);
 putpixel(200-x,200+y,15);
 if (d1 < 0)
  {
   x=x+1;
   y=y;
    dx=dx + tworysq;
    d1=d1 + dx + rysq;
    }
  else
```

```
 {
  x=x+1;
  y=y-1;
  dx= dx + tworysq;
  dy= dy - tworxsq;
  d1= d1 + dx - dy + rysq;
  }
  delay(50);
  }while (dx < dy);
 d2 = rysq * ( x + 0.5) * ( x + 0.5 ) + rxsq * (y - 1) * (y-1) - rxsq * rysq;
  do
  {
   putpixel(200+x,200+y,15);
putpixel(200-x,200-y,15);
putpixel(200+x,200-y,15);
putpixel(200-x,200+y,15);

if (d2 >0)
{
x=x;
y=y-1;
dy = dy - tworxsq;
d2 = d2 - dy + rxsq;
}
else
{
x= x+1;
y=y-1;
dy=dy - tworxsq;
```

```
            dx= dx + tworysq;
            d2 = d2 + dx -dy + rxsq;
            }
            delay(50);
          } while ( y> 0);
}


int main()
{
        int gd=DETECT, gm;
        initgraph(&gd, &gm, "");

        Bresenham_Line(); //for drawing Bresenham's Line
        Bresenham_Circle(); // for drawing Bresenham's Circle
        Bresenham_Ellipse(); // for drawing Bresenham's Ellipse

        getch();
        closegraph();

        return 0;
}
```

Output :-




Windows BGI

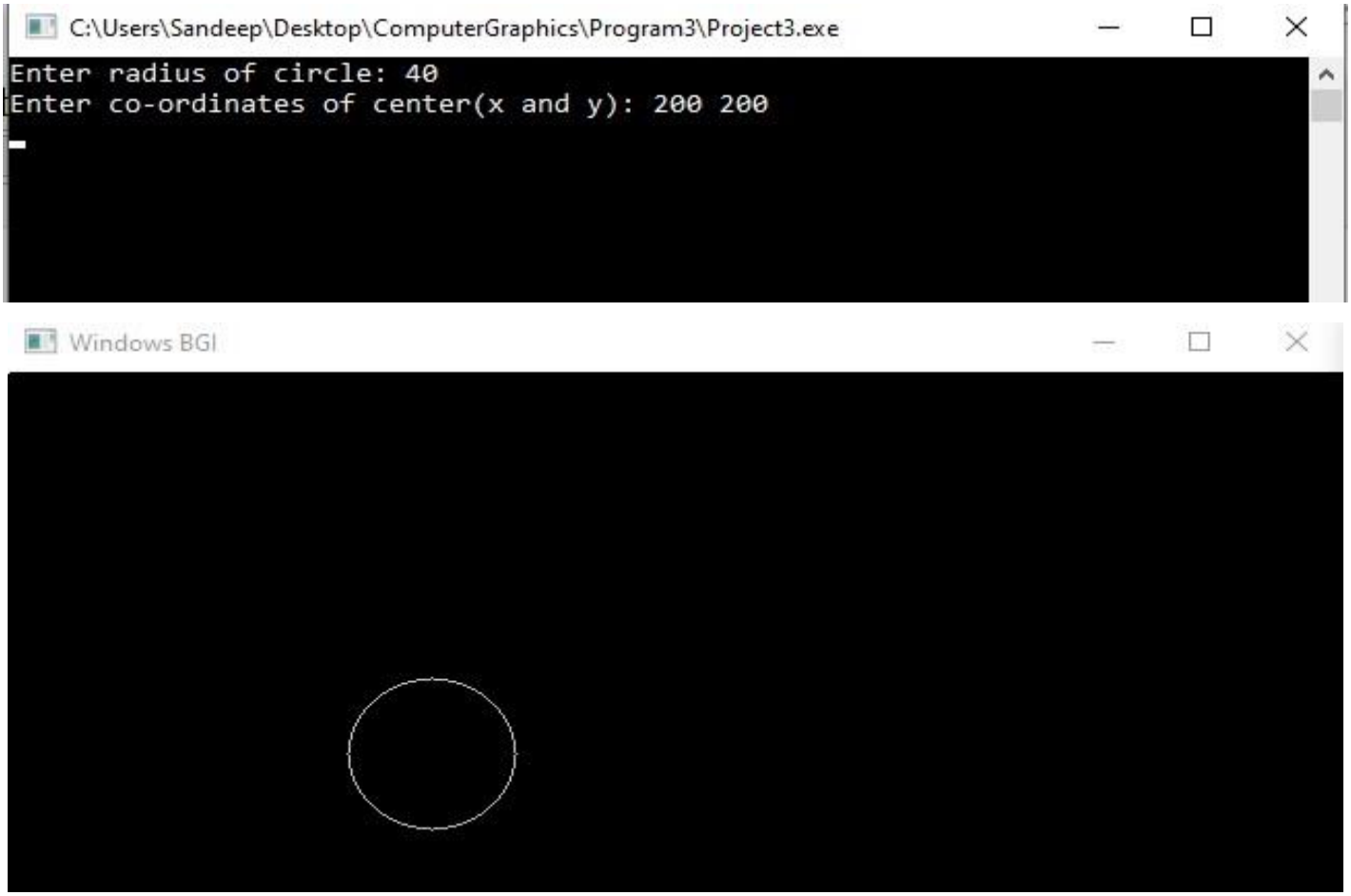
Aim :- *Write a program to implement Mid Point Circle algorithm using C .*

Code :-

```
#include<stdio.h>
#include<graphics.h>

void drawcircle(int x0, int y0, int radius)
{
   int x = radius;
   int y = 0;
   int err = 0;

   while (x >= y)
   {
        putpixel(x0 + x, y0 + y, 7);
        putpixel(x0 + y, y0 + x, 7);
        putpixel(x0 - y, y0 + x, 7);
        putpixel(x0 - x, y0 + y, 7);
        putpixel(x0 - x, y0 - y, 7);
        putpixel(x0 - y, y0 - x, 7);
        putpixel(x0 + y, y0 - x, 7);
        putpixel(x0 + x, y0 - y, 7);

        if (err <= 0)
        {
           y += 1;
           err += 2*y + 1;
        }
```

```
        if (err > 0)
        {
           x -= 1;
           err -= 2*x + 1;
        }
    }
}

int main()
{
        int gd=DETECT, gm, error, x, y, r;
        initgraph(&gd, &gm, "");

        printf("Enter radius of circle: ");
        scanf("%d", &r);
        printf("Enter co-ordinates of center(x and y): ");
        scanf("%d%d", &x, &y);

        drawcircle(x, y, r);

        getch();
        closegraph();

        return 0;
}
```

Output :-


C:\Users\Sandeep\Desktop\ComputerGraphics\Program3\Project3.exe
Enter radius of circle: 40
Enter co-ordinates of center(x and y): 200 200
Windows BGI

Aim :- *Write a program to implement Mid Point Ellipse algorithm using C .*

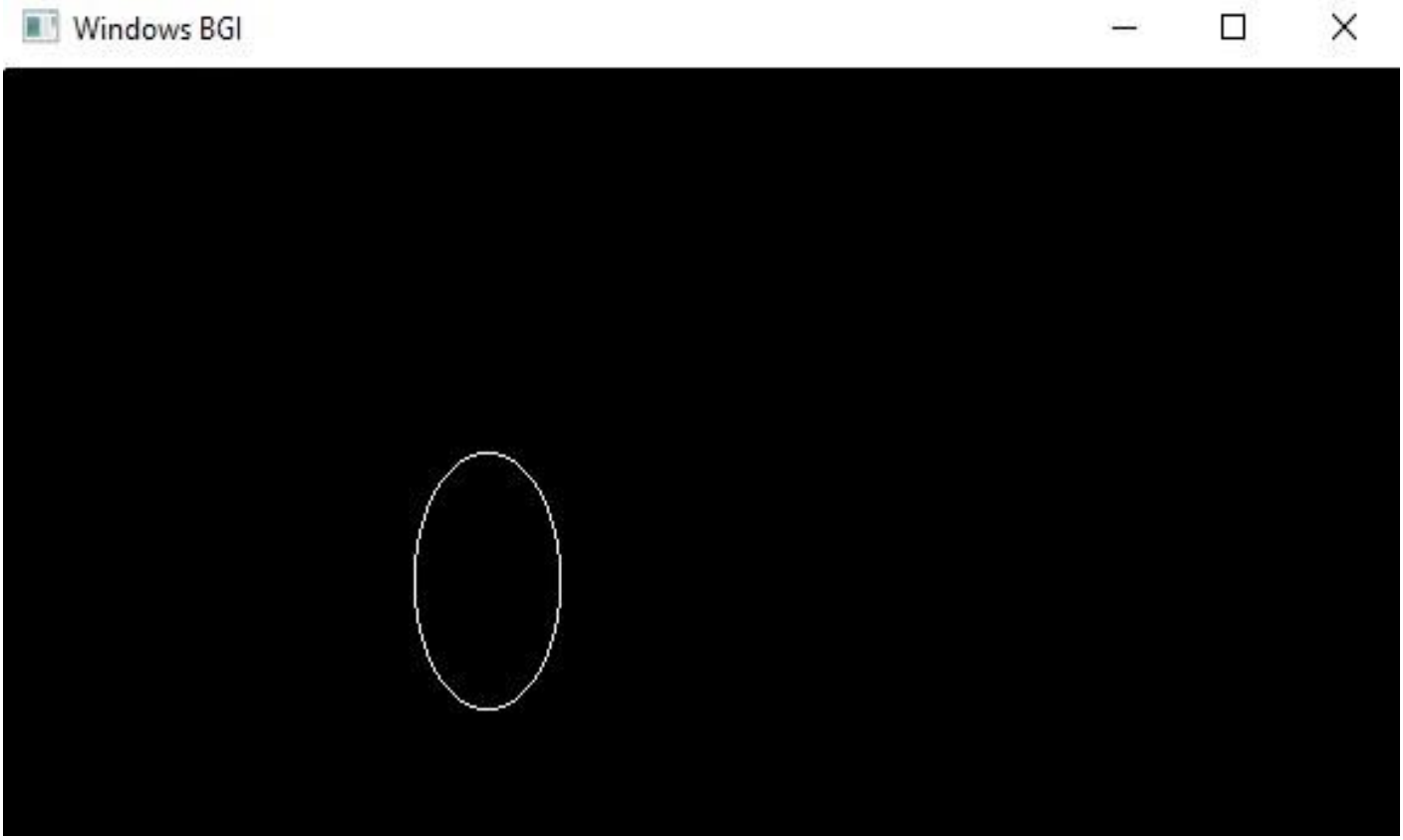
Code :-

```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>

void ellipse(int xc,int yc,int rx,int ry)
{

        int x, y, p;
        x=0;
        y=ry;
        p=(ry*ry)-(rx*rx*ry)+((rx*rx)/4);
        while((2*x*ry*ry)<(2*y*rx*rx))
        {
           putpixel(xc+x,yc-y,WHITE);
           putpixel(xc-x,yc+y,WHITE);
           putpixel(xc+x,yc+y,WHITE);
           putpixel(xc-x,yc-y,WHITE);
           if(p<0)
           {
        x=x+1;
        p=p+(2*ry*ry*x)+(ry*ry);
           }
           else
           {
        x=x+1;
        y=y-1;
```

```
        p=p+(2*ry*ry*x+ry*ry)-(2*rx*rx*y);
          }
        }
        p=((float)x+0.5)*((float)x+0.5)*ry*ry+(y-1)*(y-1)*rx*rx-rx*rx*ry*ry;
   while(y>=0)
        {
          putpixel(xc+x,yc-y,WHITE);
          putpixel(xc-x,yc+y,WHITE);
          putpixel(xc+x,yc+y,WHITE);
          putpixel(xc-x,yc-y,WHITE);

          if(p>0)
          {
        y=y-1;
        p=p-(2*rx*rx*y)+(rx*rx);
          }
          else
          {
        y=y-1;
        x=x+1;
        p=p+(2*ry*ry*x)-(2*rx*rx*y)-(rx*rx);
          }
        }
}

int main()
{
        int gm=DETECT,gd;
        initgraph(&gm,&gd,"");
```

```
        int xc,yc,rx,ry;
        printf("Enter Xc=");
        scanf("%d",&xc);
        printf("Enter Yc=");
        scanf("%d",&yc);
        printf("Enter Rx=");
        scanf("%d",&rx);
        printf("Enter Ry=");
        scanf("%d",&ry);
        ellipse(xc,yc,rx,ry);
        getch();
        closegraph();
}
```

Output :-


Windows BGI

Aim :- *Write a program to perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.*

Code :-

```
#include<graphics.h>
#include<stdio.h>
#include<conio.h>
#include<process.h>
#include<math.h>

void Translation();
void translateLine ( int P[][2], int T[]);

void Rotation();
void TriAngle(int x1, int y1, int x2, int y2, int x3, int y3);
void Rotate(int x1, int y1, int x2, int y2, int x3, int y3);

void Scaling();
void scale(int x[], int y[], int sx, int sy);

void Reflection();
void DrawFn();
void FlipV();
void FlipH();



int main()
{
        int T;
```

```
        do{
                printf("Please select your task to perform: \n");
                printf(" 1. Translation \n 2. Rotation \n 3. Scaling \n 4. Reflection \n 5. Exit \n");
                scanf("%d",&T);

                switch(T)
                {
                        case 1 :
                                Translation();
                                break;
                        case 2 :
                                Rotation();
                                break;
                        case 3 :
                                Scaling();
                                break;
                        case 4 :
                                Reflection();
                                break;
                        case 5 :
                                exit(1);
                        default :
                                printf("Invalid Choice!!");

                }
    }while(T!=5);


}
```

```
//****************Translation Function Start****************//
void Translation()
{
	int P[2][2] = {100, 100,200 , 200}; // coordinates of point
	int T[] = {10, 50}; // translation factor
	translateLine (P, T);

}

// function to translate line
void translateLine ( int P[][2], int T[])
{
	/* init graph and line() are used for
	representing line through graphical
	functions
	*/
	int gd = DETECT, gm, errorcode;
	initgraph (&gd, &gm, "");

	// drawing original line using graphics functions
	setcolor (2);
	line(P[0][0], P[0][1], P[1][0], P[1][1]);

	// calculating translated coordinates
	P[0][0] = P[0][0] + T[0];
	P[0][1] = P[0][1] + T[1];
	P[1][0] = P[1][0] + T[0];
	P[1][1] = P[1][1] + T[1];
```

```
        // drawing translated line using graphics functions
        setcolor(3);
        line(P[0][0], P[0][1], P[1][0], P[1][1]);
        getch();
        cleardevice();
        getch();
        closegraph();
}

//****************Translation Function End****************//

//****************Rotation Function Start****************//

void Rotation()
{
  int gd = DETECT, gm;
  int x1, y1, x2, y2, x3, y3;
  initgraph(&gd, &gm, " ");

  printf("Enter the 1st point for the triangle:");
  scanf("%d%d", &x1, &y1);
  printf("Enter the 2nd point for the triangle:");
  scanf("%d%d", &x2, &y2);
  printf("Enter the 3rd point for the triangle:");
  scanf("%d%d", &x3, &y3);
  TriAngle(x1, y1, x2, y2, x3, y3);
  getch();
  //cleardevice();
```

```
  Rotate(x1, y1, x2, y2, x3, y3);
  //setcolor(1);
  TriAngle(x1, y1, x2, y2, x3, y3);
  getch();
}
void TriAngle(int x1, int y1, int x2, int y2, int x3, int y3) {
  line(x1, y1, x2, y2);
  line(x2, y2, x3, y3);
  line(x3, y3, x1, y1);
}

void Rotate(int x1, int y1, int x2, int y2, int x3, int y3) {
  int x, y, a1, b1, a2, b2, a3, b3, p = x2, q = y2;
  float Angle;
  printf("Enter the angle for rotation:");
  scanf("%f", &Angle);
  //cleardevice();
  Angle = (Angle * 3.14) / 180;
  a1 = p + (x1 - p) * cos(Angle)-(y1 - q) * sin(Angle);
  b1 = q + (x1 - p) * sin(Angle)+(y1 - q) * cos(Angle);
  a2 = p + (x2 - p) * cos(Angle)-(y2 - q) * sin(Angle);
  b2 = q + (x2 - p) * sin(Angle)+(y2 - q) * cos(Angle);
  a3 = p + (x3 - p) * cos(Angle)-(y3 - q) * sin(Angle);
  b3 = q + (x3 - p) * sin(Angle)+(y3 - q) * cos(Angle);
  printf("Rotate");
  TriAngle(a1, b1, a2, b2, a3, b3);
  getch();
}
```

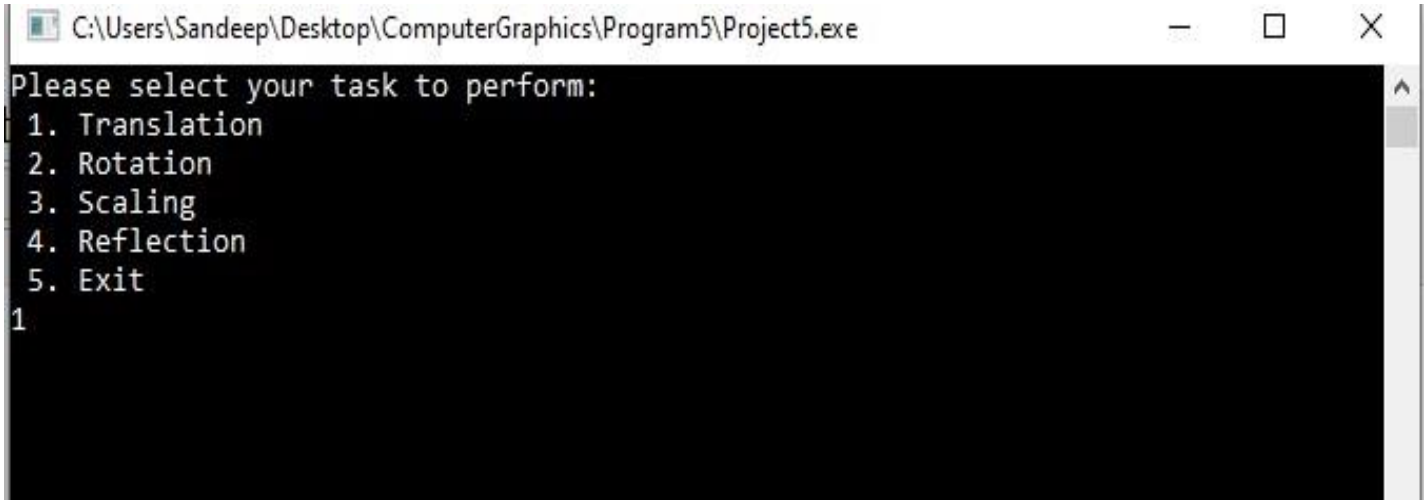
```
//****************Rotation Function End****************//


//****************Scaling Function Start****************//
void Scaling()
{
   int x[] = { 100, 200, 300 };
        int y[] = { 200, 100, 200 };
        int sx = 2, sy = 2;

        int gd, gm;
        initgraph(&gd, &gm," ");

        scale(x, y, sx,sy);
        getch();

}
void findNewCoordinate(int s[][2], int p[][1])
{
        int temp[2][1] = { 0 };

        for (int i = 0; i < 2; i++)
                for (int j = 0; j < 1; j++)
                        for (int k = 0; k < 2; k++)
                                temp[i][j] += (s[i][k] * p[k][j]);

        p[0][0] = temp[0][0];
        p[1][0] = temp[1][0];
}
```

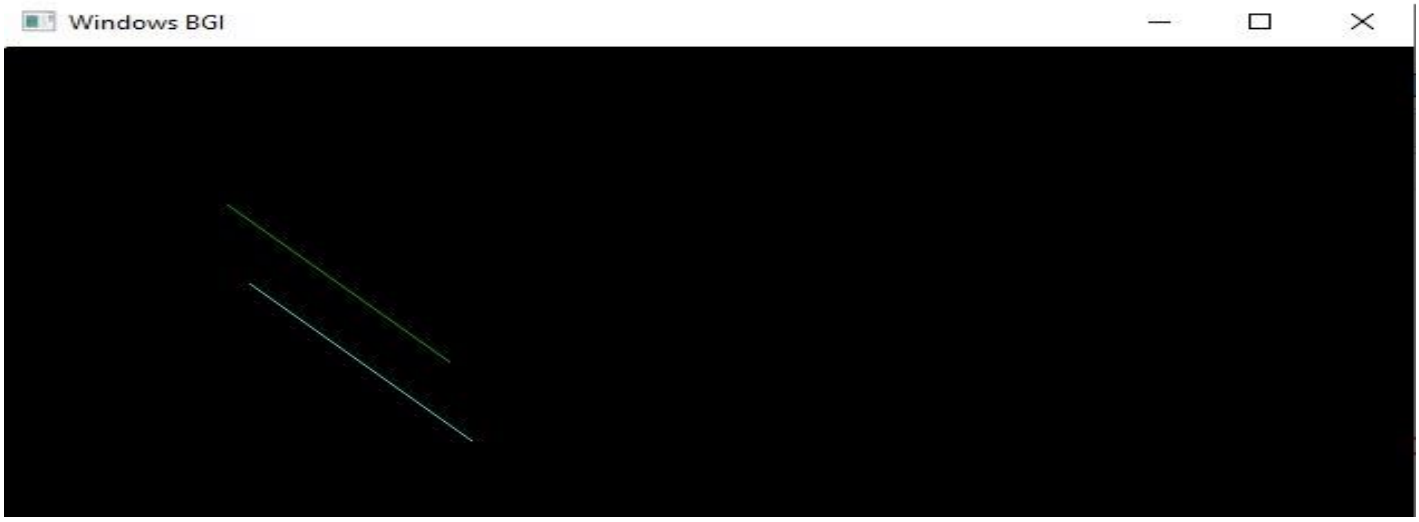
```
void scale(int x[], int y[], int sx, int sy)
{
	// Triangle before Scaling
	line(x[0], y[0], x[1], y[1]);
	line(x[1], y[1], x[2], y[2]);
	line(x[2], y[2], x[0], y[0]);

	// Initializing the Scaling Matrix.
	int s[2][2] = { sx, 0, 0, sy };
	int p[2][1];

	// Scaling the triangle
	for (int i = 0; i < 3; i++)
	{
		p[0][0] = x[i];
		p[1][0] = y[i];

		findNewCoordinate(s, p);

		x[i] = p[0][0];
		y[i] = p[1][0];
	}

	// Triangle after Scaling
	line(x[0], y[0], x[1], y[1]);
	line(x[1], y[1], x[2], y[2]);
	line(x[2], y[2], x[0], y[0]);
}
```

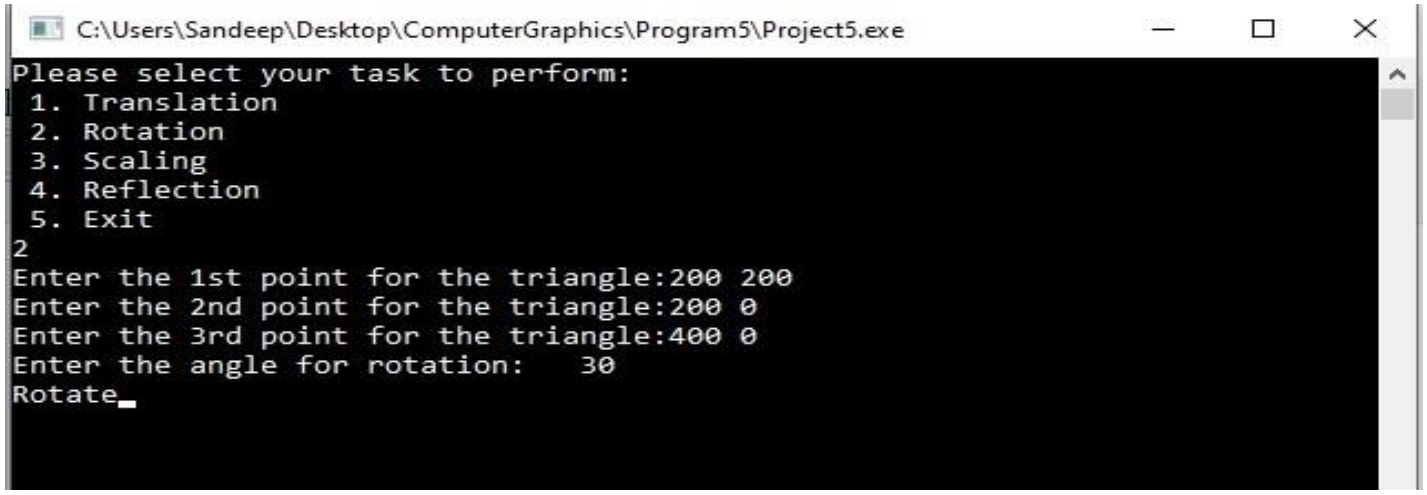
```
//****************Scaling Function End****************//


//****************Reflection Function Start****************//

int graDriver=DETECT,graMode;
int n,xs[100],ys[100],i;
int tempYaxis,tempXaxis;
void Reflection()
{
        printf("Enter number of sides: ");
        scanf("%d",&n);
        printf("Enter co-rdinates: x,y for each point ");
        for(i=0;i<n;i++)
   scanf("%d%d",&xs[i],&ys[i]);
        initgraph(&graDriver,&graMode,"");
        setcolor(RED);
        DrawFn();//original
        FlipV();
        setcolor(BLUE);
        DrawFn();//vertical flip
        FlipH();
        setcolor(GREEN);
        DrawFn();//Horizontal flip
        getch();

}

void DrawFn()
```

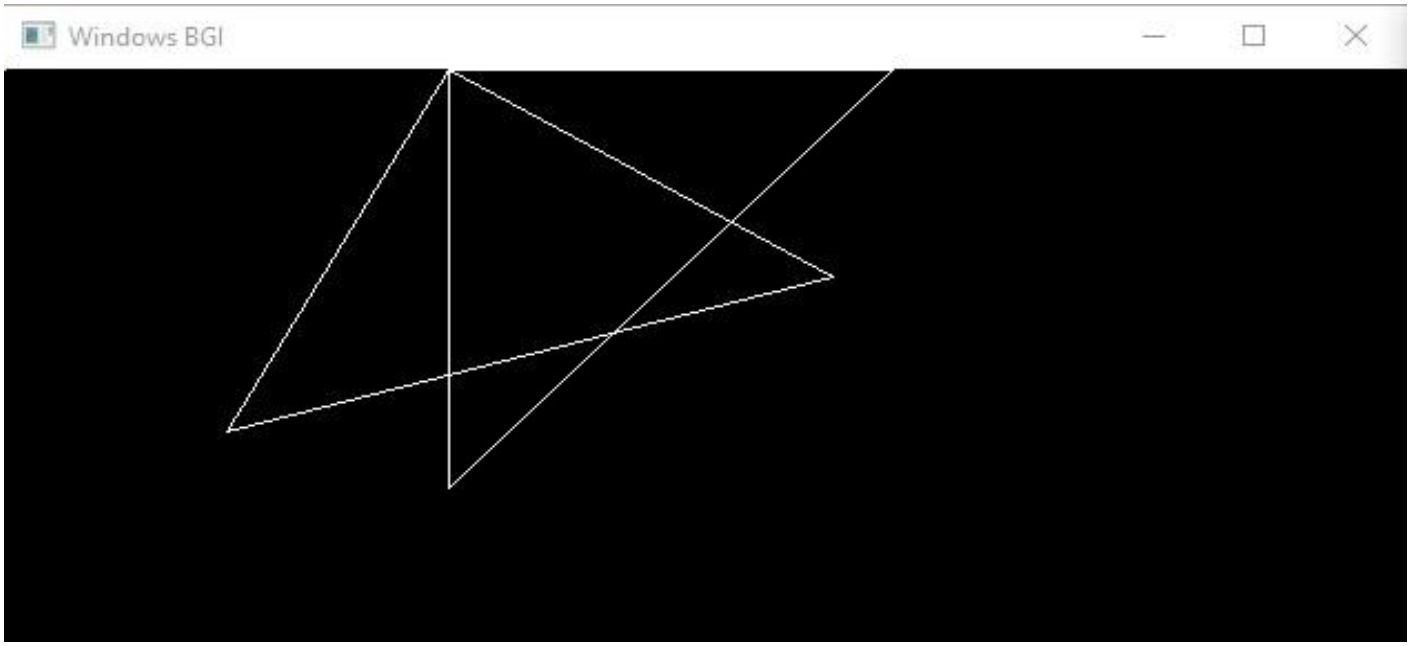
```
{
        for(i=0;i<n;i++)
    line(xs[i],ys[i],xs[(i+1)%n],ys[(i+1)%n]);
}

void FlipV()
{
        tempXaxis=getmaxy()/2;
        for(i=0;i<n;i++)
         ys[i]=tempXaxis+(tempXaxis-ys[i]);
        //drawing horizontal axis to flip about

        for(i=0;i<getmaxx();i++)
         putpixel(i,tempXaxis,WHITE);
}

void FlipH()
{
        tempYaxis=getmaxx()/2;
        for(i=0;i<n;i++)
         xs[i]=tempYaxis+(tempYaxis-xs[i]);
        setcolor(WHITE);
        //drawing vertical axis
        for(i=0;i<getmaxy();i++)
         putpixel(tempYaxis,i,WHITE);

}

//****************Reflection Function End****************//
```

Output :-


C:\Users\Sandeep\Desktop\ComputerGraphics\Program5\Project5.exe
Please select your task to perform:
1. Translation
2. Rotation
3. Scaling
4. Reflection
5. Exit
1

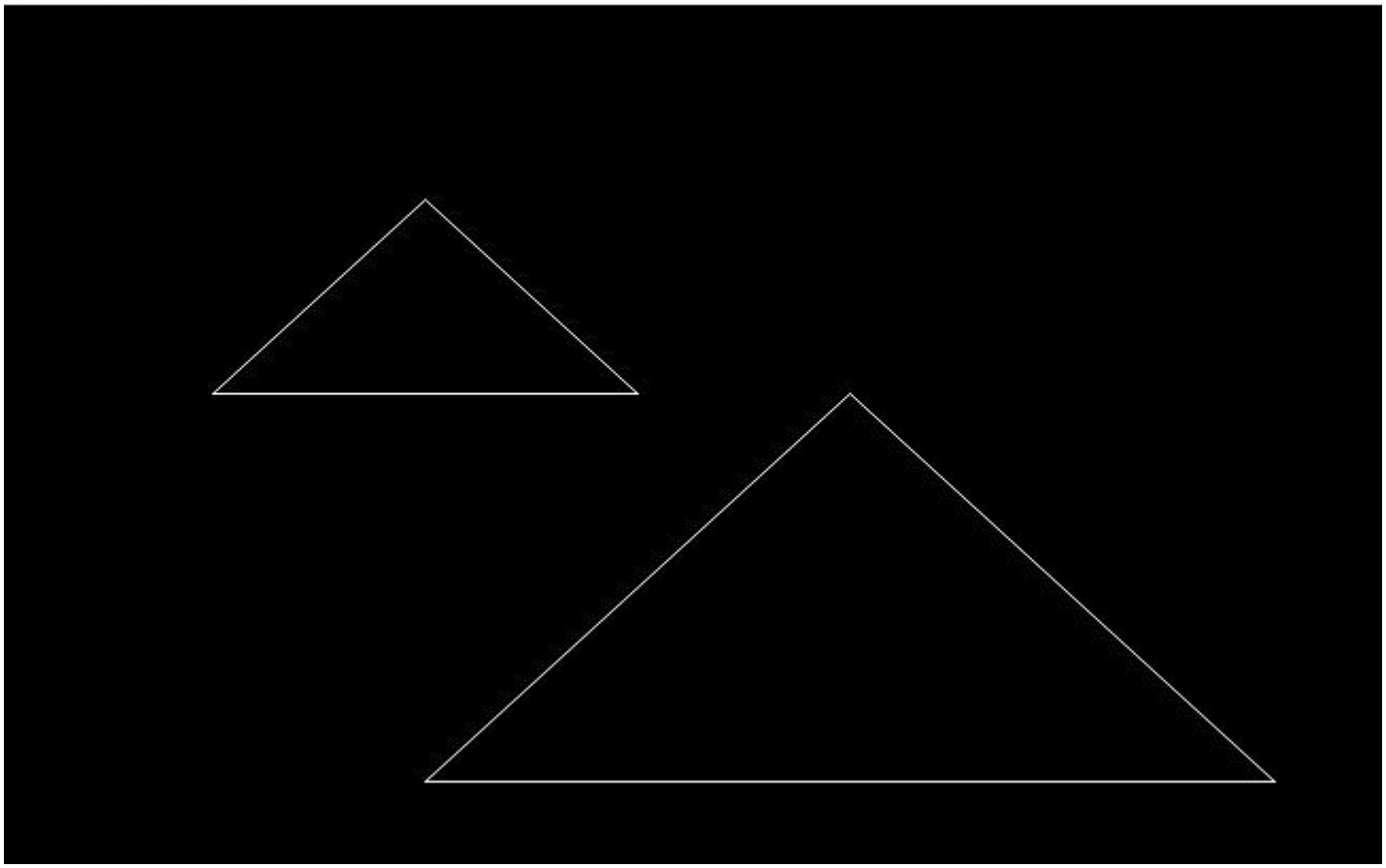

Windows BGI


C:\Users\Sandeep\Desktop\ComputerGraphics\Program5\Project5.exe
Please select your task to perform:
1. Translation
2. Rotation
3. Scaling
4. Reflection
5. Exit
2
Enter the 1st point for the triangle:200 200
Enter the 2nd point for the triangle:200 0
Enter the 3rd point for the triangle:400 0
Enter the angle for rotation: 30
Rotate


Windows BGI

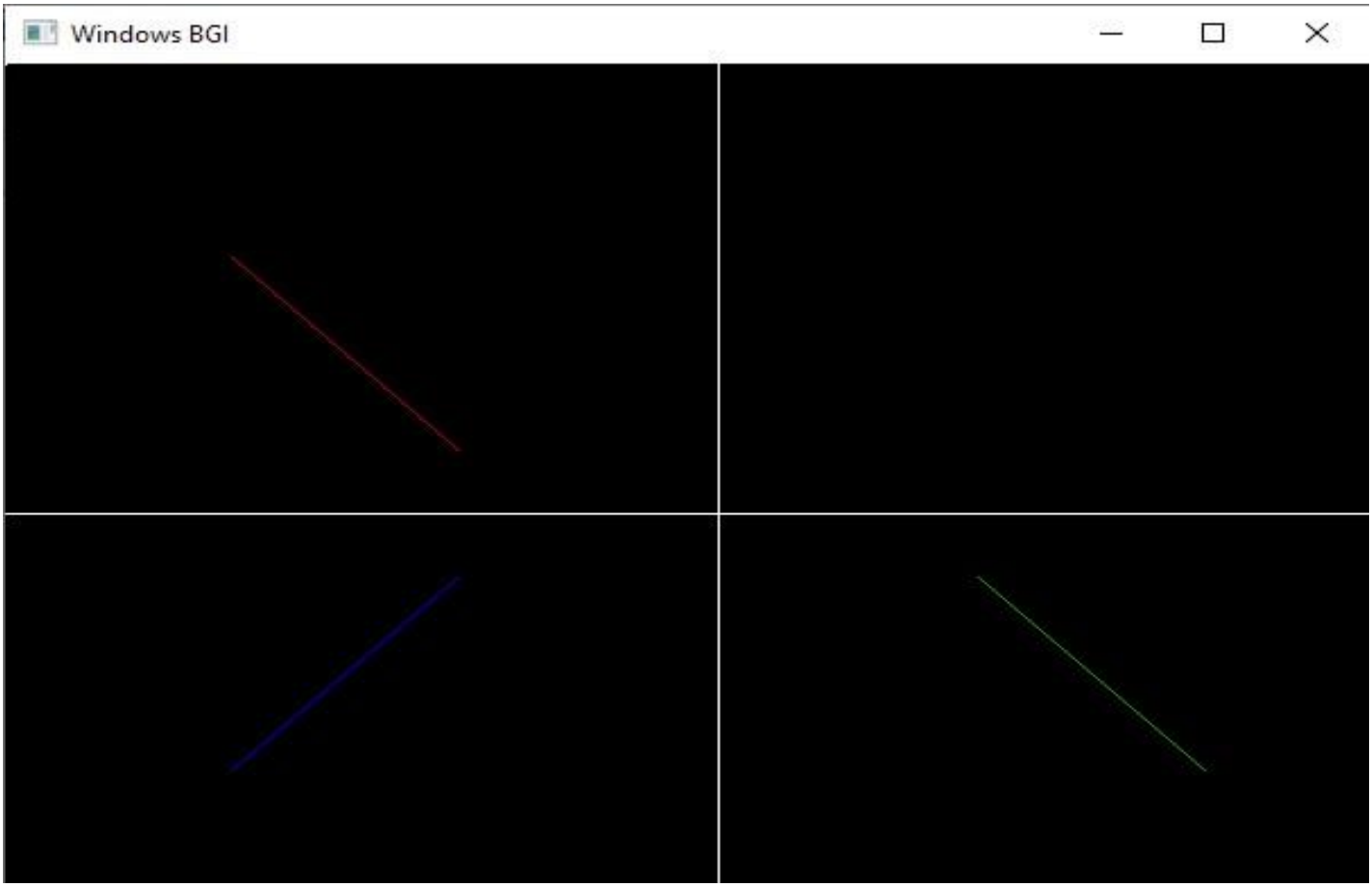

C:\Users\Sandeep\Desktop\ComputerGraphics\Program5\Project5.exe
Please select your task to perform:
1. Translation
2. Rotation
3. Scaling
4. Reflection
5. Exit
3

Windows BGI



C:\Users\Sandeep\Desktop\ComputerGraphics\Program5\Project5.exe

```
Please select your task to perform:
 1. Translation
 2. Rotation
 3. Scaling
 4. Reflection
 5. Exit
4
Enter number of sides: 2
Enter co-rdinates: x,y for each point 100 100
200 200
```


Windows BGI

Aim :- *Write a program to implement Cohen–Sutherland 2D clipping and window–viewport mapping.*

Code :-

```
#include<stdio.h>
#include<stdlib.h>
#include<math.h>
#include<graphics.h>
#include<dos.h>

typedef struct coordinate
{
        int x,y;
        char code[4];
}PT;

void drawwindow();
void drawline(PT p1,PT p2);
PT setcode(PT p);
int visibility(PT p1,PT p2);
PT resetendpt(PT p1,PT p2);

int main()
{
        int gd=DETECT,v,gm;
        PT p1,p2,p3,p4,ptemp;

        printf("\nEnter x1 and y1\n");
        scanf("%d %d",&p1.x,&p1.y);
```

```
printf("\nEnter x2 and y2\n");
scanf("%d %d",&p2.x,&p2.y);

initgraph(&gd,&gm,"c:\\turboc3\\bgi");
drawwindow();
delay(500);

drawline(p1,p2);
delay(500);
cleardevice();

delay(500);
p1=setcode(p1);
p2=setcode(p2);
v=visibility(p1,p2);
delay(500);

switch(v)
{
case 0: drawwindow();
                delay(500);
                drawline(p1,p2);
                break;
case 1:         drawwindow();
                delay(500);
                break;
case 2:         p3=resetendpt(p1,p2);
                p4=resetendpt(p2,p1);
                drawwindow();
```

```
                delay(500);
                drawline(p3,p4);
                break;
        }

        delay(5000);
        closegraph();
}

void drawwindow()
{
        line(150,100,450,100);
        line(450,100,450,350);
        line(450,350,150,350);
        line(150,350,150,100);
}

void drawline(PT p1,PT p2)
{
        line(p1.x,p1.y,p2.x,p2.y);
}

PT setcode(PT p)    //for setting the 4 bit code
{
        PT ptemp;

        if(p.y<100)
                ptemp.code[0]='1';//Top
        else
```

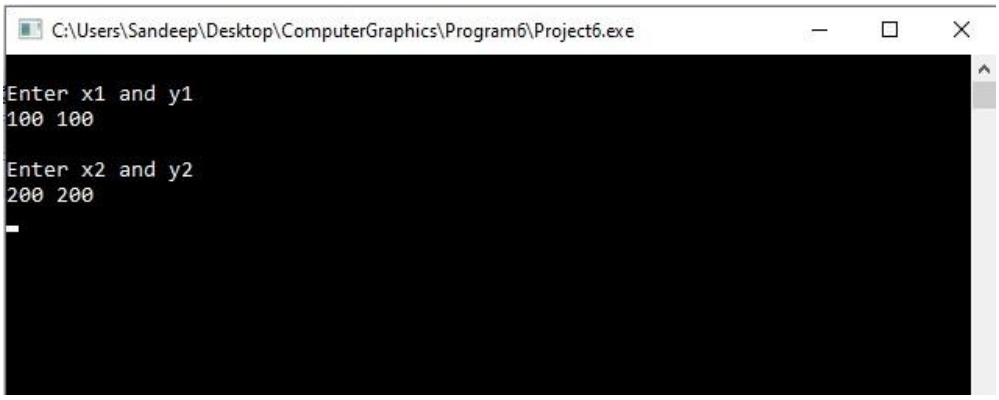
```
		ptemp.code[0]='0';

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

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

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

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

	return(ptemp);
}

int visibility(PT p1,PT p2)
{
	int i,flag=0;

	for(i=0;i<4;i++)
	{
```

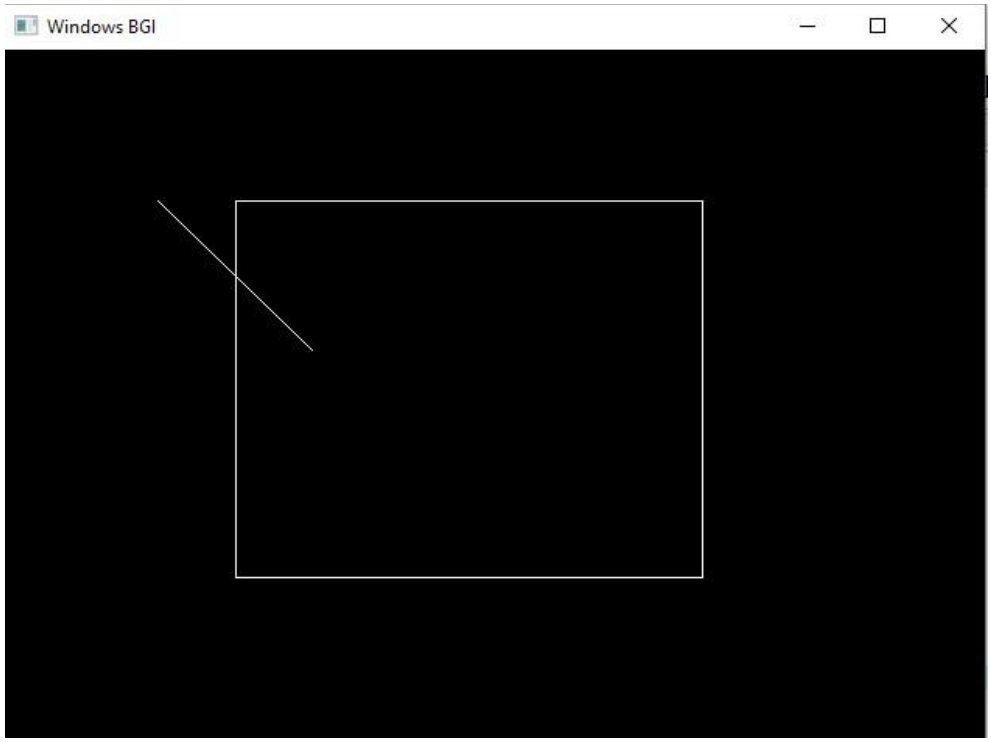
```
            if((p1.code[i]!='0') || (p2.code[i]!='0'))
                    flag=1;
        }

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

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

        if(flag==0)
            return(1);

        return(2);
}

PT resetendpt(PT p1,PT p2)
{
        PT temp;
        int x,y,i;
        float m,k;

        if(p1.code[3]=='1')
            x=150;

        if(p1.code[2]=='1')
```

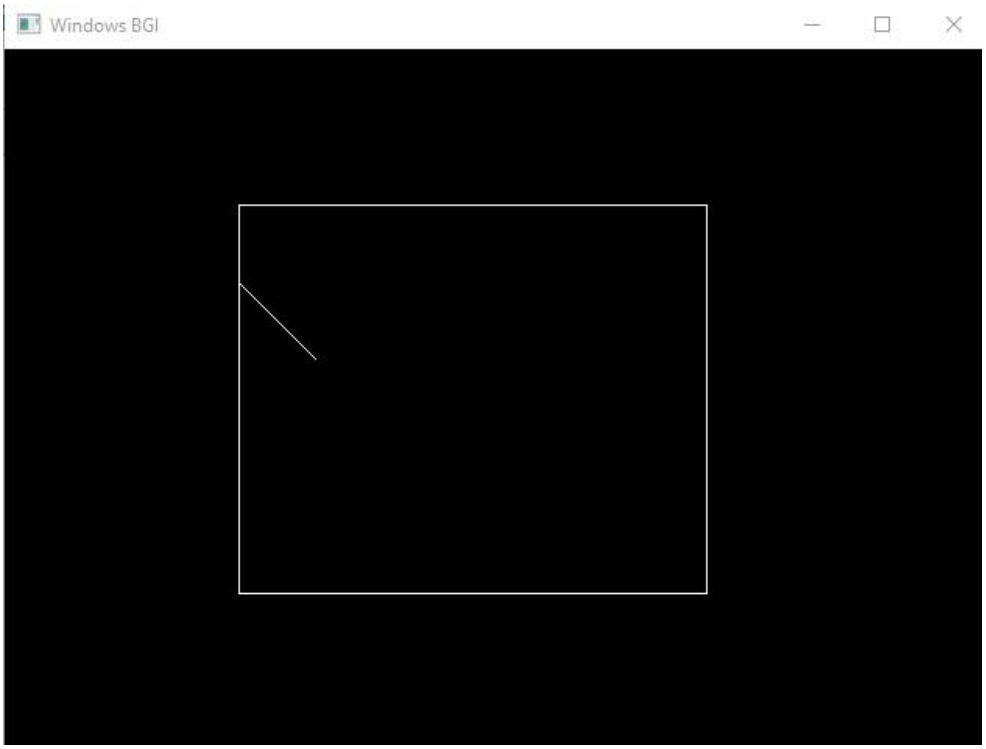
```
        x=450;

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[0]=='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);
}
```

Output :-






Windows BGI

Aim :- *Write a program to implement Liang Barksy Line Clipping Algorithm.*

Code :-

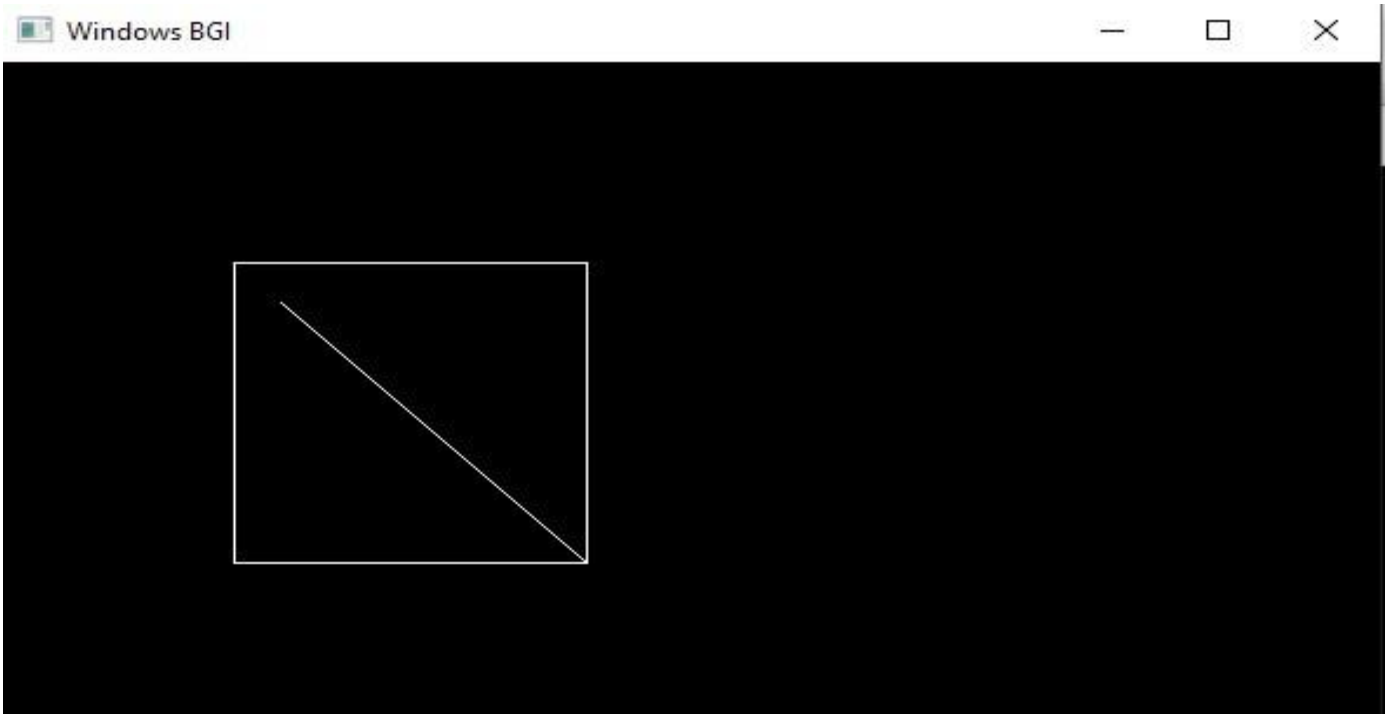
```
#include<stdio.h>
#include<graphics.h>
#include<math.h>
#include<dos.h>

int main()
{
        int i,gd=DETECT,gm;
        int x1,y1,x2,y2,xmin,xmax,ymin,ymax,xx1,xx2,yy1,yy2,dx,dy;
        float t1,t2,p[4],q[4],temp;

        x1=120;
        y1=120;
        x2=300;
        y2=300;

        xmin=100;
        ymin=100;
        xmax=250;
        ymax=250;

        initgraph(&gd,&gm,"");
        rectangle(xmin,ymin,xmax,ymax);
        dx=x2-x1;
        dy=y2-y1;
```

```
p[0]=-dx;
p[1]=dx;
p[2]=-dy;
p[3]=dy;

q[0]=x1-xmin;
q[1]=xmax-x1;
q[2]=y1-ymin;
q[3]=ymax-y1;

for(i=0;i<4;i++)
{
        if(p[i]==0)
        {
                printf("line is parallel to one of the clipping boundary");
                if(q[i]>=0)
                {
                        if(i<2)
                        {
                                if(y1<ymin)
                                {
                                        y1=ymin;
                                }

                                if(y2>ymax)
                                {
                                        y2=ymax;
                                }
```

```
                        line(x1,y1,x2,y2);
                }

                if(i>1)
                {
                        if(x1<xmin)
                        {
                                x1=xmin;
                        }

                        if(x2>xmax)
                        {
                                x2=xmax;
                        }

                        line(x1,y1,x2,y2);
                }
        }
    }
}

t1=0;
t2=1;

for(i=0;i<4;i++)
{
        temp=q[i]/p[i];

        if(p[i]<0)
```

```
            {
                if(t1<=temp)
                    t1=temp;
            }
            else
            {
                if(t2>temp)
                    t2=temp;
            }
        }

        if(t1<t2)
        {
            xx1 = x1 + t1 * p[1];
            xx2 = x1 + t2 * p[1];
            yy1 = y1 + t1 * p[3];
            yy2 = y1 + t2 * p[3];
            line(xx1,yy1,xx2,yy2);
        }

        getch();
        closegraph();
}
```

Output :-


Windows BGI

Aim :- *To perform 3D Transformations such as translation, rotation and scaling.*

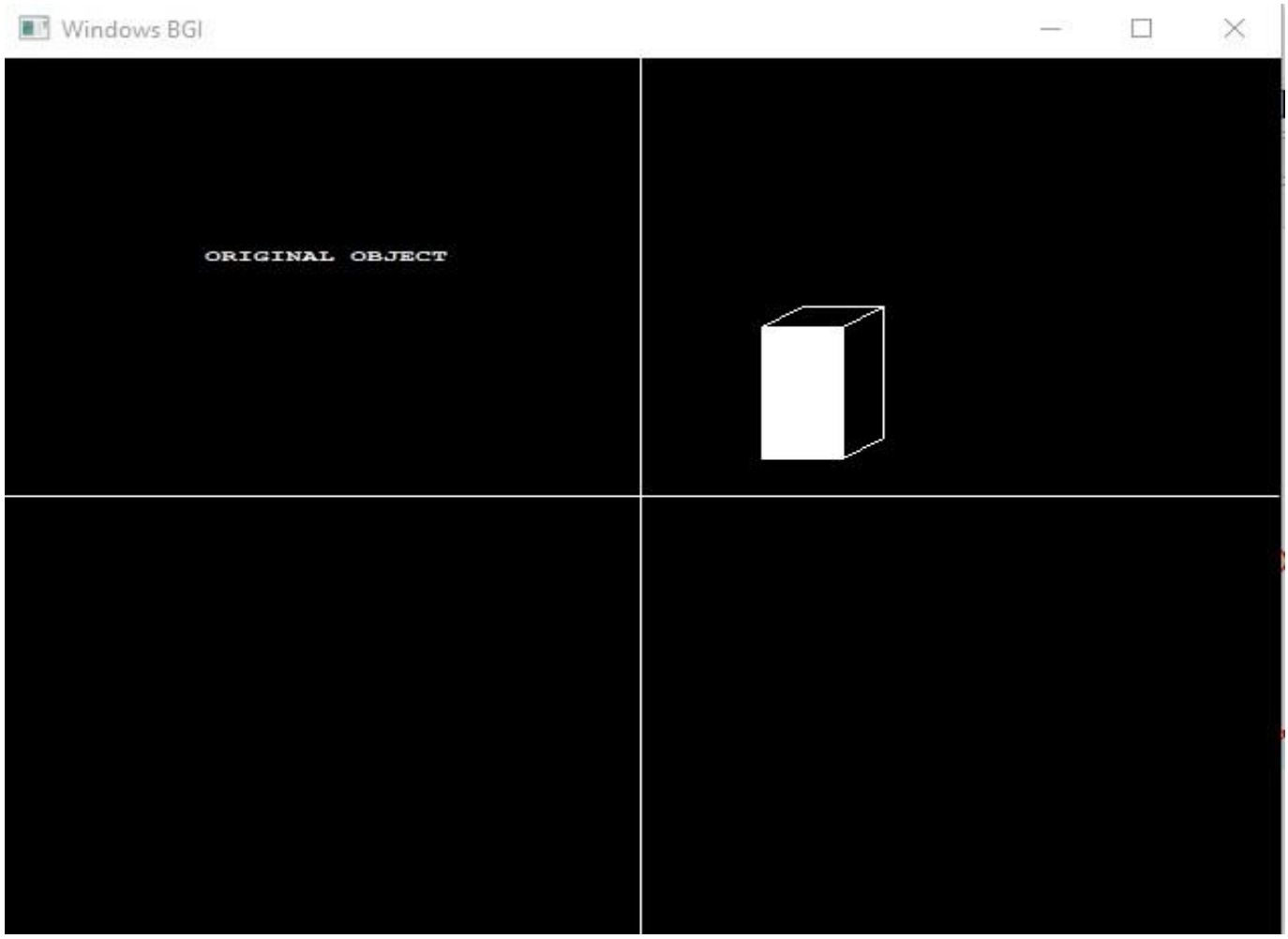
Code :-

```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>
#include<math.h>
int maxx,maxy,midx,midy;

void axis()
{
  getch();
  cleardevice();
  line(midx,0,midx,maxy);
  line(0,midy,maxx,midy);
}
int main()
{
  int gd,gm,x,y,z,ang,x1,x2,y1,y2;
  detectgraph(&gd,&gm);
  initgraph(&gd,&gm,"C:/TC/BGI");
  setfillstyle(3,25);
  maxx=getmaxx();
  maxy=getmaxy();
  midx=maxx/2;
  midy=maxy/2;
  outtextxy(100,100,"ORIGINAL OBJECT");
  line(midx,0,midx,maxy);
  line(0,midy,maxx,midy);
```

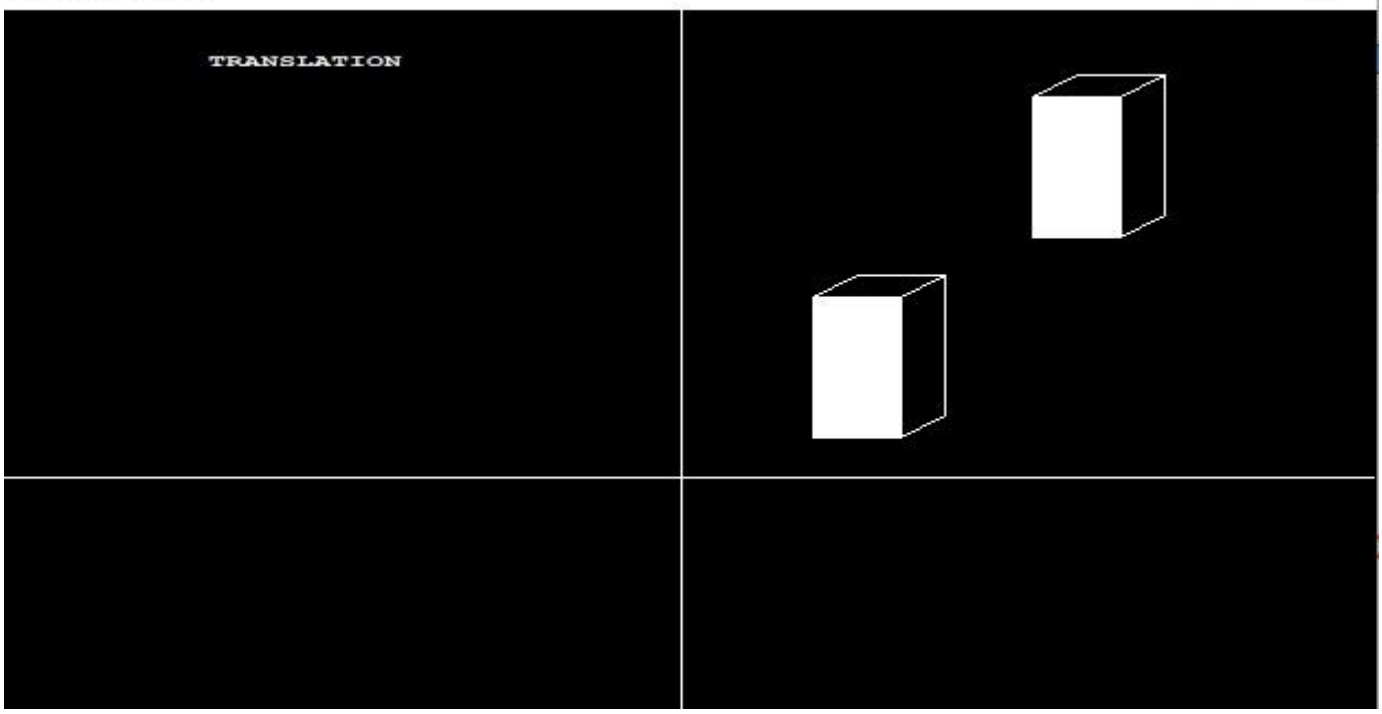
```
bar3d(midx+100,midy-20,midx+60,midy-90,20,5);
axis();
outtextxy(100,20,"TRANSLATION");
printf("\n\n Enter the Translation vector: ");
scanf("%d%d",&x,&y);
bar3d(midx+100,midy-20,midx+60,midy-90,20,5);
bar3d(midx+(x+100),midy-(y+20),midx+(x+60),midy-(y+90),20,5);
axis();
outtextxy(100,20,"SCALING");
printf("\n Enter the Scaling Factor: ");
scanf("%d%d%d",&x,&y,&z);
bar3d(midx+100,midy-20,midx+60,midy-90,20,5);
bar3d(midx+(x*100),midy-(y*20),midx+(x*60),midy-(y*90),20*z,5);
axis();
outtextxy(100,20,"ROTATION");
printf("\n Enter the Rotation angle: ");
scanf("%d",&ang);
x1=100*cos(ang*3.14/180)-20*sin(ang*3.14/180);
y1=100*sin(ang*3.14/180)+20*sin(ang*3.14/180);
x2=60*cos(ang*3.14/180)-90*sin(ang*3.14/180);
y2=60*sin(ang*3.14/180)+90*sin(ang*3.14/180);
axis();
printf("\n After rotating about z-axis\n");
bar3d(midx+100,midy-20,midx+60,midy-90,20,5);
bar3d(midx+x1,midy-y1,midx+x2,midy-y2,20,5);
axis();
printf("\n After rotating about x-axis\n");
bar3d(midx+100,midy-20,midx+60,midy-90,20,5);
bar3d(midx+100,midy-x1,midx+60,midy-x2,20,5);
```

```
  axis();
  printf("\n After rotating about y-axis\n");
  bar3d(midx+100,midy-20,midx+60,midy-90,20,5);
  bar3d(midx+x1,midy-20,midx+x2,midy-90,20,5);
  axis();
  closegraph();
}
```

Output :-



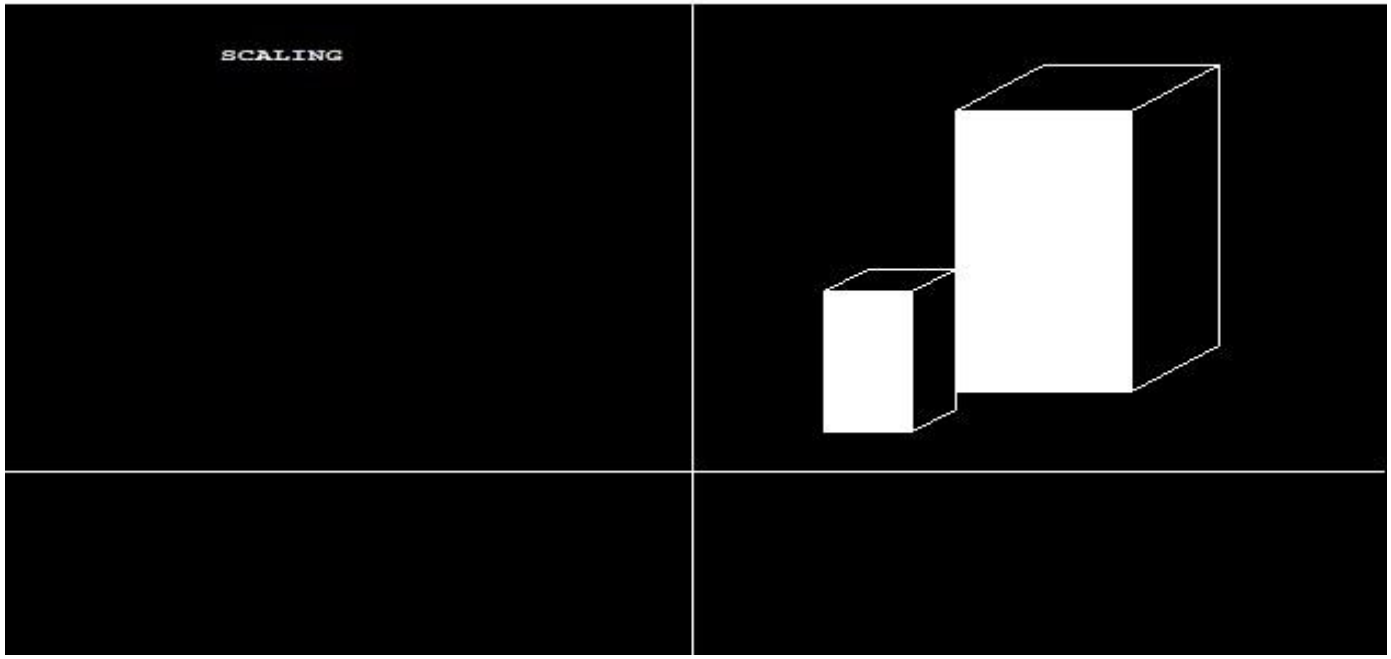
Windows BGI



C:\Users\Sandeep\Desktop\ComputerGraphics\Program8\Project8.exe

```
Enter the Translation vector: 100 100

Enter the Scaling Factor: 2 2 2
```

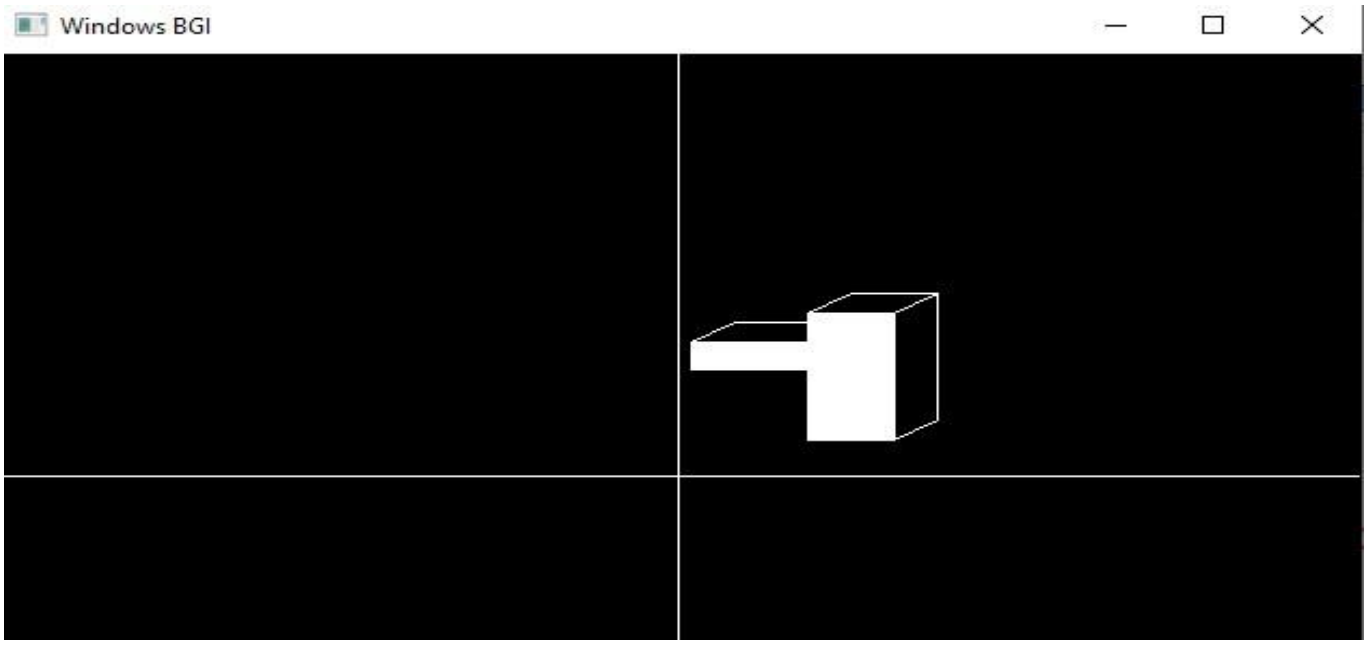
Windows BGI



C:\Users\Sandeep\Desktop\ComputerGraphics\Program8\Project8.exe

```
Enter the Translation vector: 100 100

Enter the Scaling Factor: 2 2 2

Enter the Rotation angle: 30

After rotating about z-axis
```

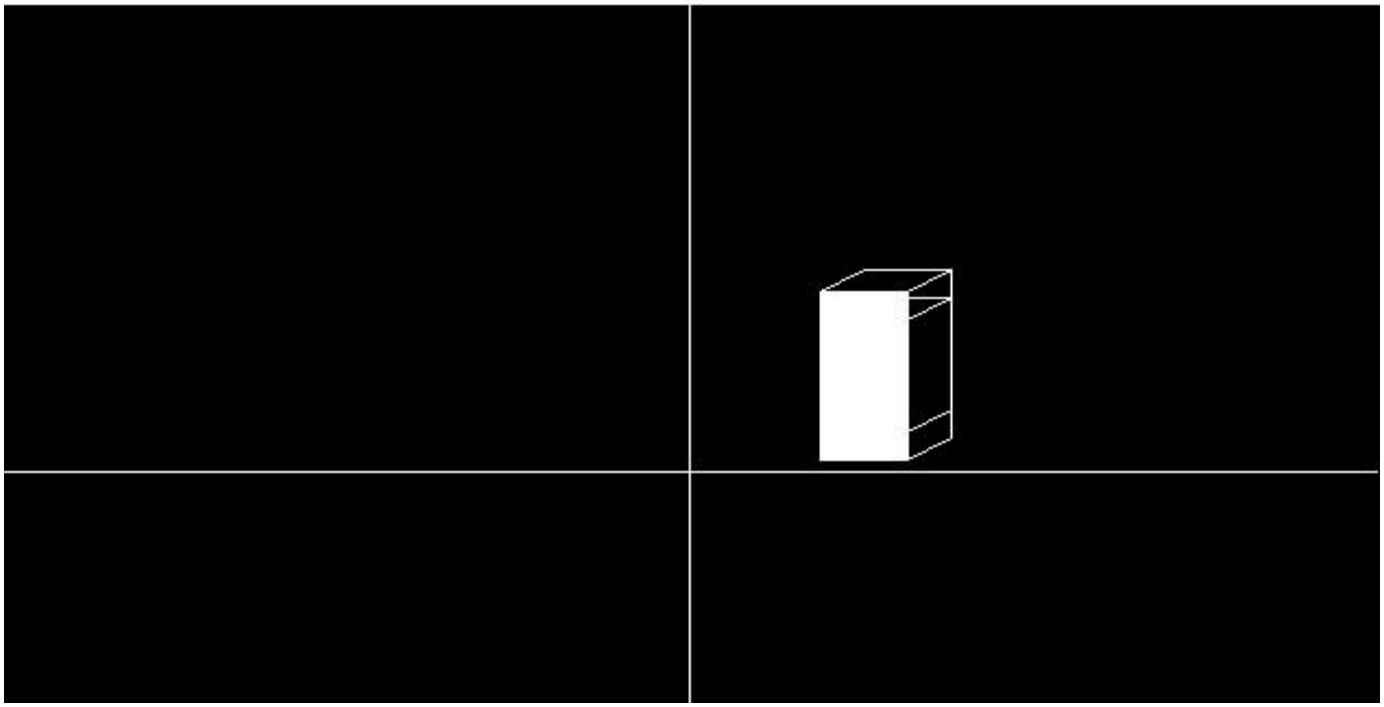
Windows BGI



C:\Users\Sandeep\Desktop\ComputerGraphics\Program8\Project8.exe

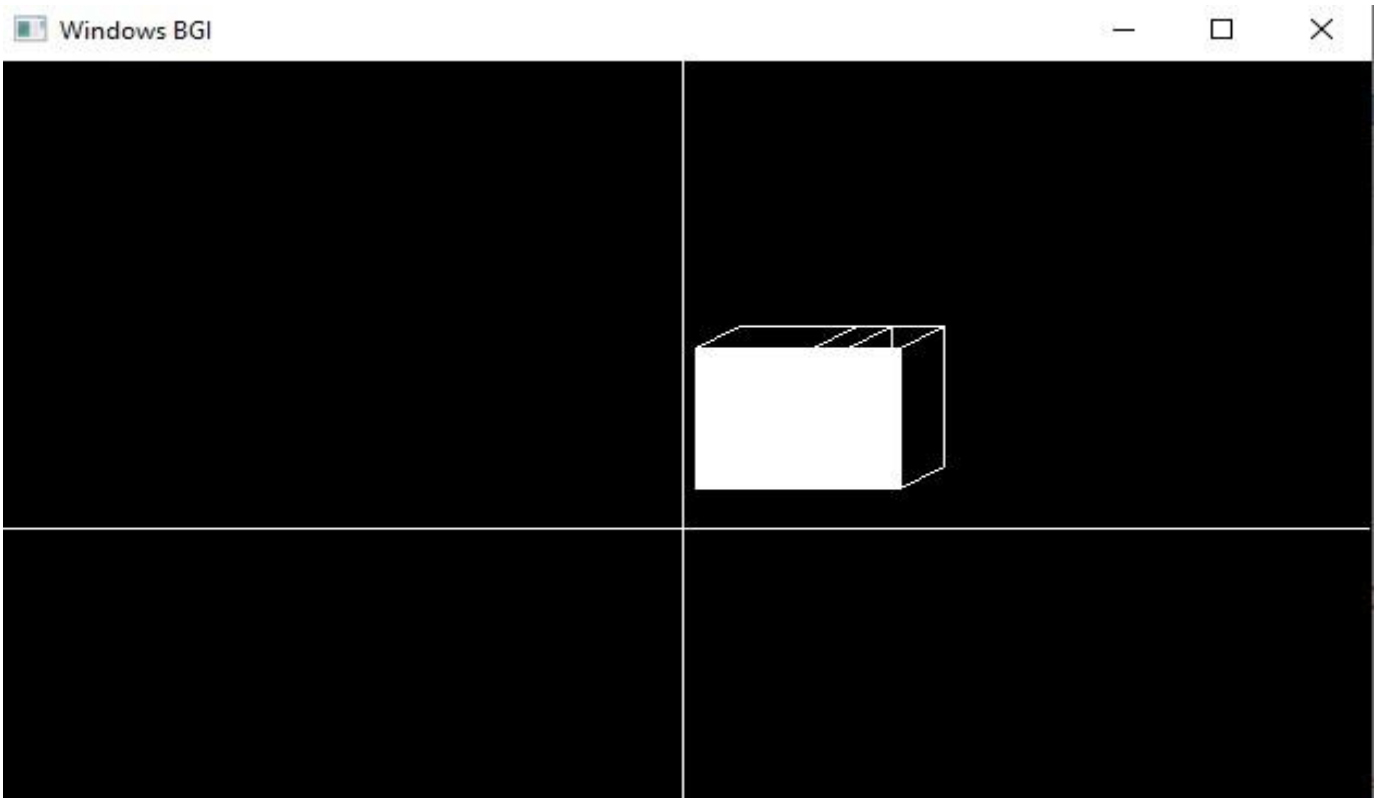
```
Enter the Translation vector: 100 100

Enter the Scaling Factor: 2 2 2

Enter the Rotation angle: 30

After rotating about z-axis

After rotating about x-axis
```

Windows BGI



C:\Users\Sandeep\Desktop\ComputerGraphics\Program8\Project8.exe

```
Enter the Translation vector: 100 100

Enter the Scaling Factor: 2 2 2

Enter the Rotation angle: 30

After rotating about z-axis

After rotating about x-axis

After rotating about y-axis
```


Windows BGI

Aim :- *Write a program to convert between color models.*

Code :-

```
#include<stdio.h>
#include<conio.h>
#define MIN(a,b) (a<b?a:b)
#define MAX(a,b) (a>b?a:b)
#define NO_HUE -1
void rgbtohsv(float r,float g,float b)
{
 float h,s,v;
 float max=MAX(r,MAX(g,b)),min=MIN(r,MIN(g,b));
 float delta=max-min;
 v=max;
 if(max!=0.0)
  s=delta/max;
 else
  s=0.0;
 if(s==0.0)
  h=NO_HUE;
 else
 {
  if(r==max)
   h=(g-b)/delta;
  else if(g==max)
   h=2+(b-r)/delta;
  else if(b==max)
   h=4+(r-g)/delta;
  h*=60.0;
```

```
  if(h<0)
    h+=360.0;
  h/=360.0;
 }
 printf("\n H=%f\n S=%f\n V=%f",h,s,v);
}
int main()
{
 float a,b,c;

 printf("\n Enter the RGB values:\n");
 scanf("%f%f%f",&a,&b,&c);
 printf("\nThe HSV values:\n");
 rgbtohsv(a,b,c);
}
```

Output :-