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Practical File

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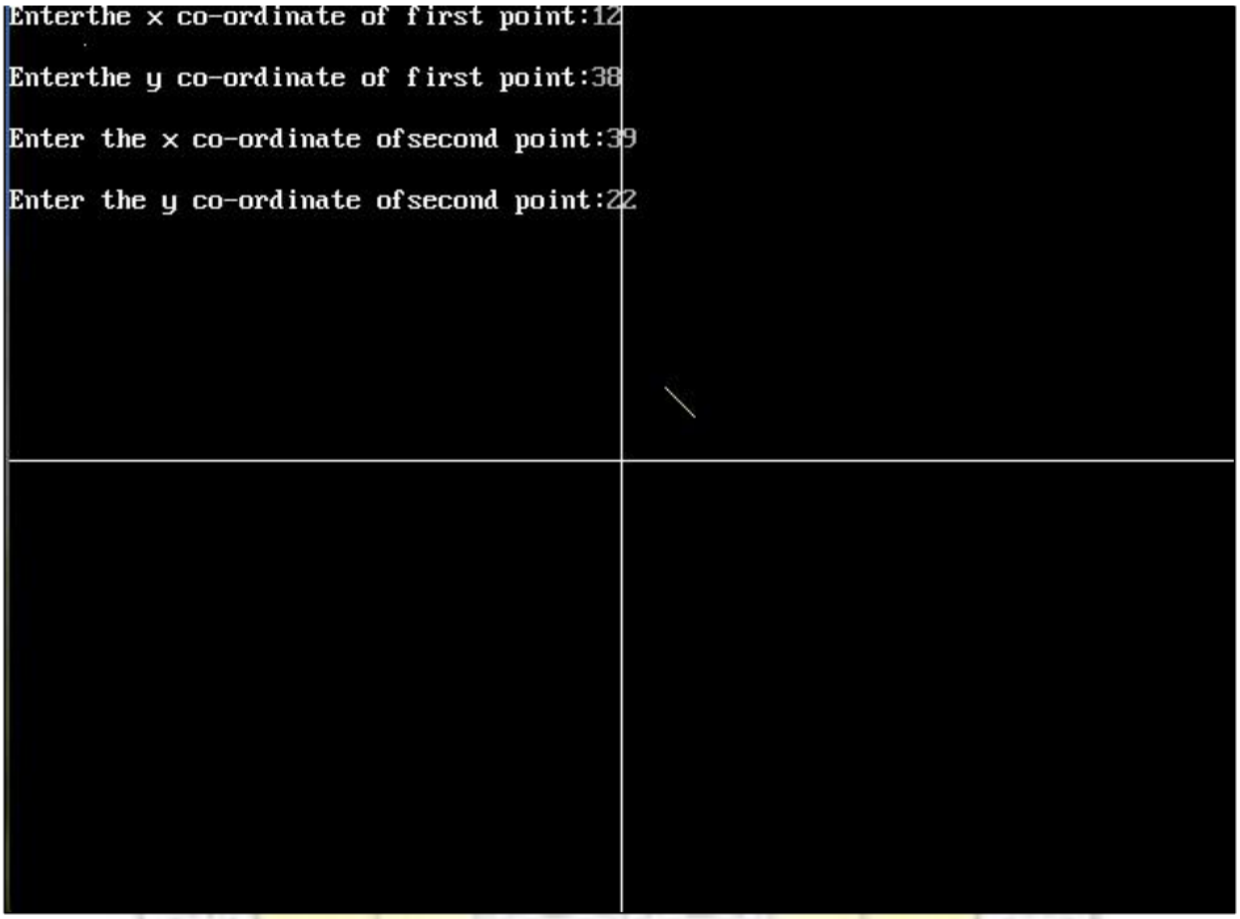
Q1. Write a program to implement Bresenham's line drawing algorithm and DDA
solution:

```
Bresenham's #include<iostream.h> #include<conio.h>
#include<graphics.h> #include<math.h>
void bresenham_line_algo(int x1,int y1,int x2,int y2)
{
float dy,dx,p;    int x,y,xend,yend,dx1,dy1;                int xmid,ymid;
xmid=getmaxx()/2; ymid=getmaxy()/2; dx=abs(x2-x1);         dy=abs(y2-
y1);      dx1=x2-x1;      dy1=y2- y1;     float m;
m=dy1/dx1;
const int c1=2*dy,c2=2*(dy-dx); const int d1=2*dx,d2=2*(dx-dy); if(m<=1&&m>0){
p=2*dy-dx; if(x1>x2){
x=x2; y=y2;

else{ y=y1;
xend=x2;
 x=x1;
}
xend=x1;
}
putpixel(x,y,YELLOW); while(x<xend){
x++;
if(p<0){ p=p+c1;
}          else{
y++;
p=p+c2;
}
}
else{ p=2*dx-dy; if(y1>y2){
}
y=y2;
x=x2; yend=y1;

putpixel(xmid+x,ymid-y,YELLOW);

}
else{ x=x1; y=y1; yend=y2;
}
putpixel(x,y,YELLOW); while(y<yend){
y++;
if(p<0){
p=p+d1;
x--;
 }
else{
p=p+d2;          }
putpixel(xmid+x,ymid-y,YELLOW);
}
}
}
void main(){
```

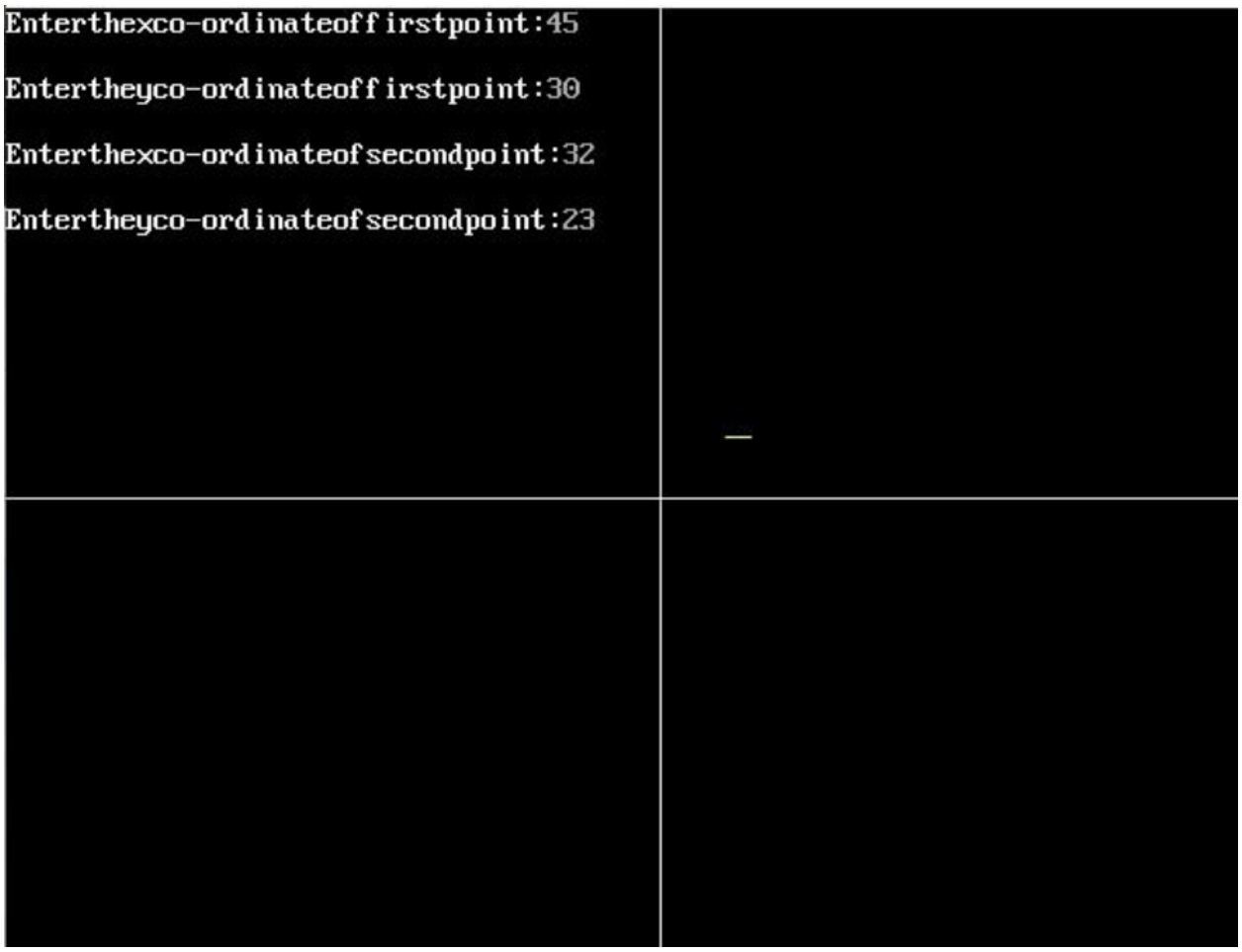
```
clrscr();           int gdriver=DETECT,gmode,errorcode;         int x1,y1,x2,y2,xmid,ymid;
initgraph(&gdriver,&gmode,"C:\\TURBOC3\\BGI");
cout<<"Enterthexco-ordinateoffirstpoint:";

cin>>x1;
cout<<"\nEntertheyco-ordinateoffirstpoint:"; cin>>y1;
cout<<"\nEnterthexco-ordinateofsecondpoint:"; cin>>x2;
cout<<"\nEntertheyco- ordinateofsecondpoint:";       cin>>y2; xmid=getmaxx()/2;
ymid=getmaxy()/2; line(xmid,0,xmid,getmaxy()); line(0,ymid,getmaxx(),ymid);
bresenham_line_algo(x1,y1,x2,y2); getch();}
```

DDA




```
#include<iostream.h> #include<conio.h> #include<graphics.h> #include<math.h>
void dda_line_algo(intx1,inty1,intx2,inty2){ int dx,dy,st; dx=x2-
x1; dy=y2-y1; float y,x,xinc,yinc; int xmid,ymid; xmid=getmaxx()/2; ymid=getmaxy()/2;
if(abs(dx)>abs(dy)){ st=abs(dx);}
else{ st=abs(dy);}
xinc=dx/st; yinc=dy/st; x=x1; y=y1; for(inti=0;i<st;i++){ x+=xinc; y+=yinc;

putpixel(ceil(x)+xmid,ymid-ceil(y),YELLOW);}}
void main(){ clrscr();
int gdriver=DETECT,gmode,errorcode; int x1,y1,x2,y2,xmid,ymid;
initgraph(&gdriver,&gmode,"C:\\TURBOC3\\BGI"); cout<<"Enterthexco-ordinateoffirstpoint:";
cin>>x1;
cout<<"\nEntertheyco-ordinateoffirstpoint:"; cin>>y1;
cout<<"\nEnterthexco-ordinateofsecondpoint:"; cin>>x2;
cout<<"\nEntertheyco-ordinateofsecondpoint:"; cin>>y2; xmid=getmaxx()/2;
```

ymid=getmaxy()/2; line(xmid,0,xmid,getmaxy()); line(0,ymid,getmaxx(),ymid);
dda_line_algo(x1,y1,x2,y2); getch();}



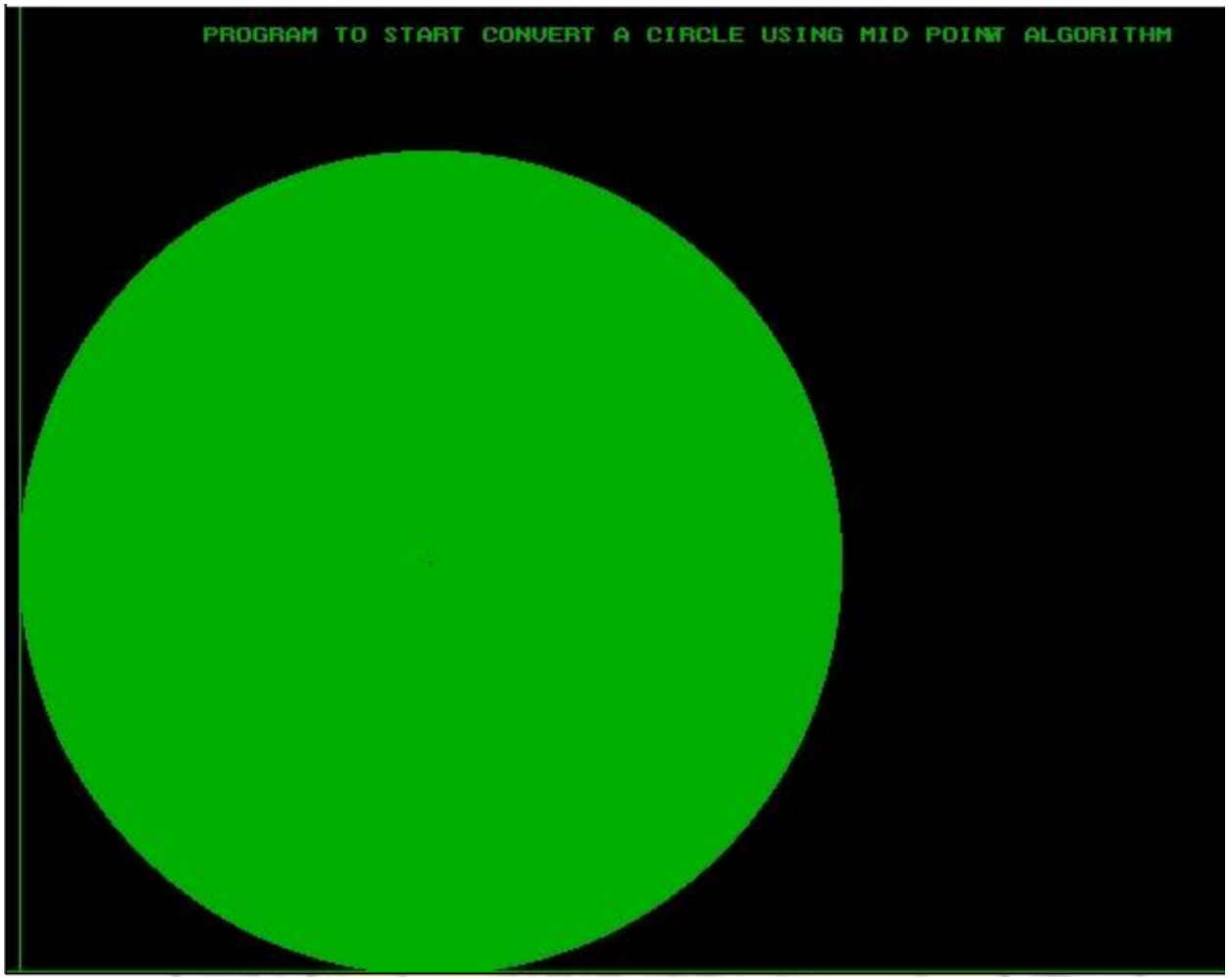
Q2: Write a program to implement midpoint circle algorithm Solution:

#include<iostream.h> #include<conio.h.> #include<graphics.h>

void midpointcircle(int,int,int); void main()
{ int x,y,r;
clrscr();
cout<<"ENTER THE VALUES FOR X,Y,R : "; cin>>x>>y>>r;
midpointcircle(x,y,r); getch();
}
void midpointcircle(int a,int b,int r)

{
int gd=DETECT,gm; initgraph(&gd,&gm,"c:\\turboc3\\bgi"); setfillstyle(1,GREEN);
setcolor(GREEN);
outtextxy(100,10,"PROGRAM TO START CONVERT A CIRCLE USING MID POINT
ALGORITHM");
line(10,480,10,0);
outtextxy(480,10,"Y"); line(0,470,640,470);
outtextxy(640,70,"X"); int x=0,y=r,d=1-r; while(x<=y)
{
putpixel(10+(a+x),470-(b+y),2); putpixel(10+(a+x),470-(b-

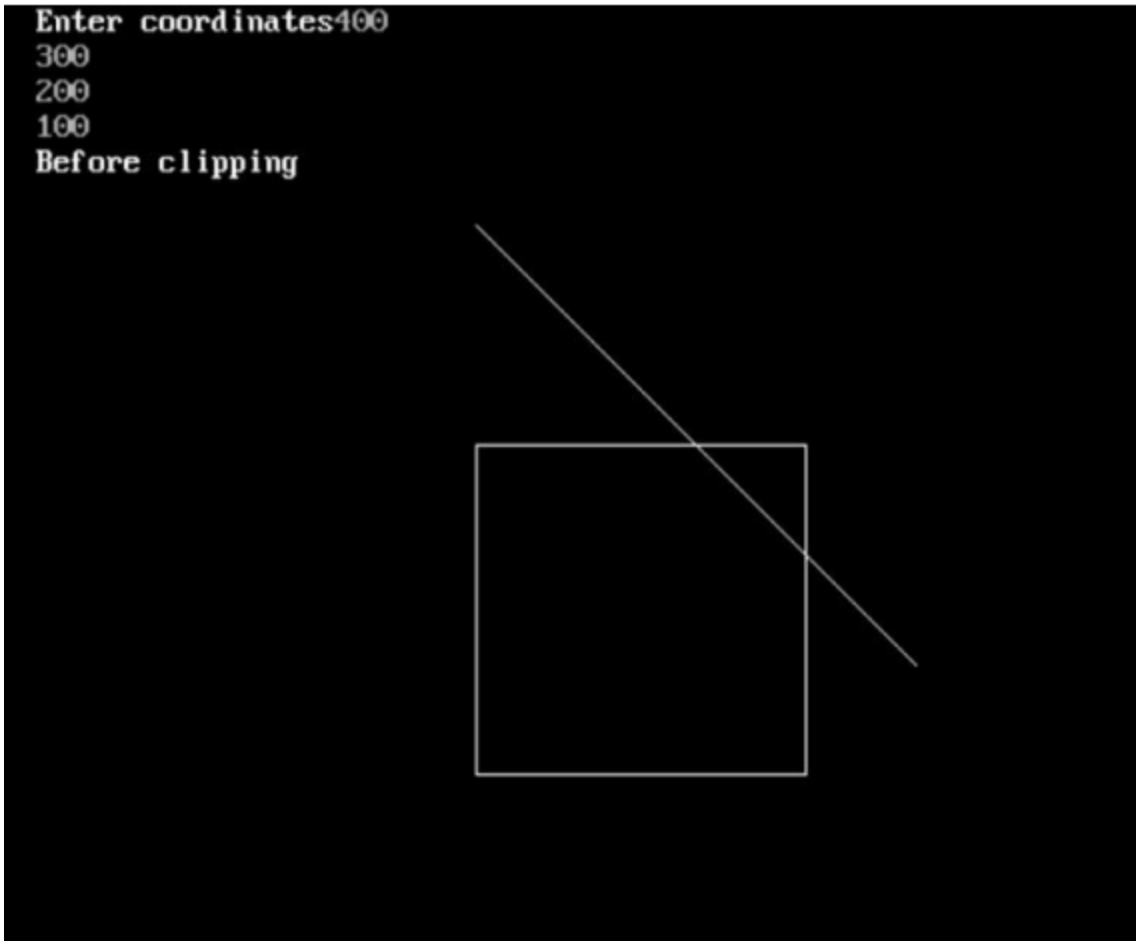
```
y),2); putpixel(10+(a-x),470-(b+y),2); putpixel(10+(a+y),470-
(b+x),2); putpixel(10+(a-x),470-(b-y),2);
putpixel(10+(a+y),470-(b-x),2); putpixel(10+(a-y),470-
(b+x),2); putpixel(10+(a-y),470-(b-x),2); if(d<0)
d=d+(2*x)+3; else
{d=d+(2*(x-y))+5; y--;
} x++;
}
floodfill(10+a,470-b,GREEN); putpixel(10+a,470-b,0);
}
```

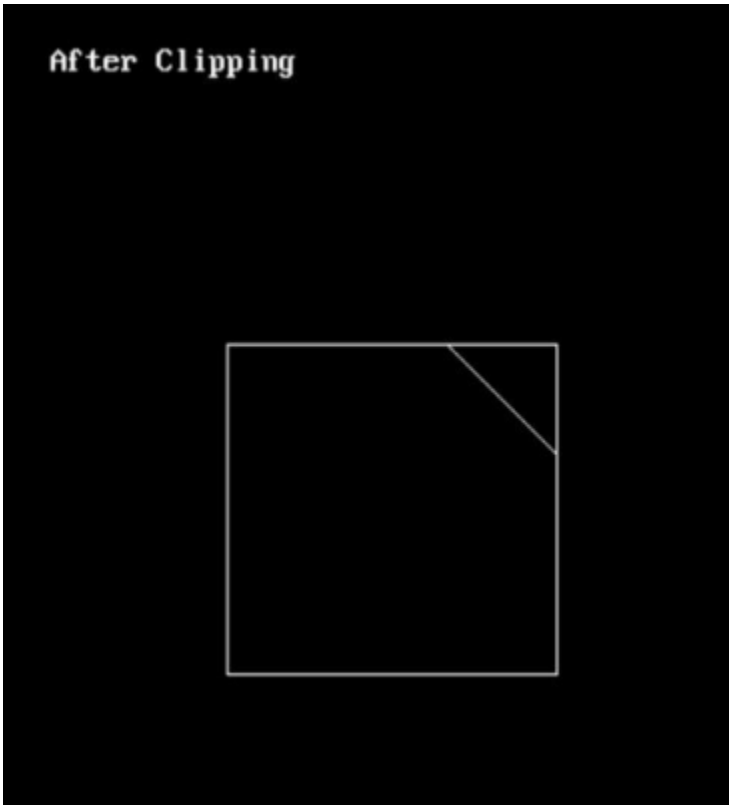


Q3: Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
Solution:

```
#include<iostream.h> #include<conio.h>
#include<graphics.h> #include<math.h> void Window()
{
line (200,200,350,200); line(350,200,350,350); line(200,200,200,350); line(200,350,350,350);
}
void Code(char c[4],float x,float y) { c[0]=(x<200)?'1':'0';
c[1]=(x>350)?'1':'0'; c[2]=(y<200)?'1':'0';        c[3]=(y>350)?'1':'0';
}
void Clipping (char c[],char d[],float &x,float &y,float m)
{
int flag=1,i=0; for (i=0;i<4;i++)
{
if(c[i]!='0' && d[i]!='0')
```

```
{
flag=0;
break;
}
if(flag)
{
if(c[0]!='0')
{
y=m*(200-x)+y;
x=200;
}
else if(c[1]!='0')
{
y=m*(350-x)+y;
x=350;
}
else if(c[2]!='0')
{
x=((200-y)/m)+x; y=200;
}
else if(c[3]!='0')
{
x=((350-y)/m)+x; y=350;
}
}
if (flag==0) cout<<"Line lying outside";
}
}
void main()
{
int gdriver = DETECT, gmode, errorcode; float x1,y1,x2,y2;
float m; char c[4],d[4];
clrscr();
initgraph(&gdriver, &gmode, "//Turboc3//bgi"); cout<<"Enter coordinates";
cin>>x1>>y1>>x2>>y2; cout<<"Before clipping"; Window(); line(x1,y1,x2,y2); getch();
cleardevice(); m=float((y2-y1)/(x2- x1));
Code(c,x1,y1);
Code(d,x2,y2) ;
Clipping(c,d,x1,y1,m);
Clipping(d,c,x2,y2,m); cout<<"After Clipping"; Window(); line(x1,y1,x2,y2); getch(); closegraph();
}
```


Enter coordinates400
300
200
100
Before clipping


After Clipping

Q4: Write a program to clip a polygon using the Sutherland Hodgeman algorithm.
Solution:

```
#include<iostream.h> #include<conio.h> #include<stdio.h> #include<graphics.h>
#include<dos.h>
union REGS i, o; struct pt
{
int x, y;
};

float xl, xr, yt, yb, m, slope[20]; int bc = 0, xc, yc, n = 0, k;
int dx, dy, x, y, temp, a[20][2], xi[20];

struct point
{
float x, y;
};

enum bound
{
left,
right,
bottom,
top
};

int inside( struct point p, enum bound b )
{
int c = 1;
switch( b )
{

case left:

c = 0;


if( p.x < xl )

break;  case right:
if( p.x > xr ) c = 0;
break;  case

bottom:


if( p.y > yb )
c = 0;
```

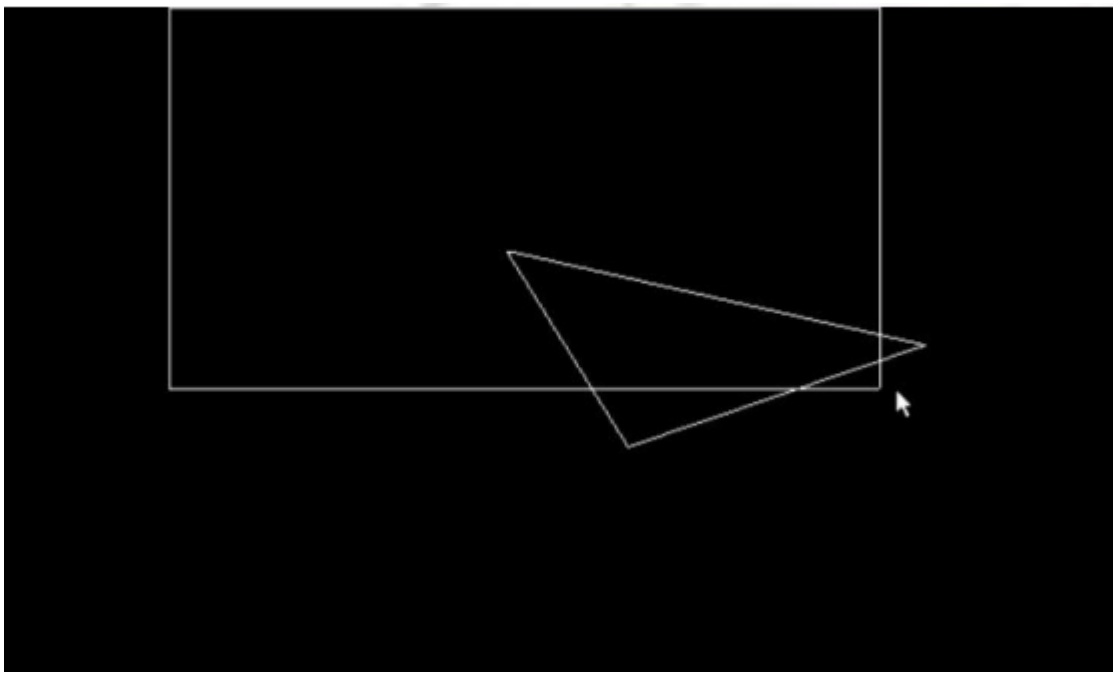
```
case top:

break;

if( p.y < yt ) c = 0;

break;
}

return c;
}

struct point intersect( struct point p1, struct point p2, enum bound b )
{
struct point t; float m = 0;

if( p2.x != p1.x )
m = ( p2.y - p1.y ) / ( p2.x - p1.x );

switch( b )
{

case left:


t.x = xl;
t.y = p2.y + ( xl - p2.x ) * m;


case right:

break;

t.x = xr;
t.y = p2.y + ( xr - p2.x ) * m; break;    case bottom:
t.y = yb;


if( p1.x == p2.x )
t.x = p2.x;
else
t.x = p2.x + ( yb - p2.y ) / m;
break;
case top:
t.y = yt;
if( p1.x == p2.x )
t.x = p2.x;
else
t.x = p2.x + ( yt - p2.y ) / m;
break;
}
```

```
return t;
}

int initmouse( )
{
i.x.ax = 0; int86( 0X33, &i, &o ); return( o.x.ax );
}

void showmouseptr( )
{
i.x.ax = 1;
int86( 0X33, &i, &o );
}

void hidemouseptr( )

{
i.x.ax = 2;
int86( 0X33, &i, &o );
}

void getmousepos( int *button, int *x, int *y )
{
i.x.ax = 3; int86( 0X33, &i, &o );
*button = o.x.bx;
*x = o.x.cx;
*y = o.x.dx;
}

void main( )
{
enum bound b; int cou, i, flag;
struct point p[30], pout[30], z;

int gdriver = DETECT, gmode; initgraph( &gdriver, &gmode, "..\\BGI" );
cleardevice( ); showmouseptr( );

while( bc != 2 )
{
getmousepos( &bc, &xc, &yc );

if( bc == 1 )
{
p[n].x = xc;
p[n].y = yc;
n++;

hidemouseptr( ); if( n > 1 )
line( p[n-2].x, p[n-2].y, xc, yc );          showmouseptr( ); delay( 100 );
}
```

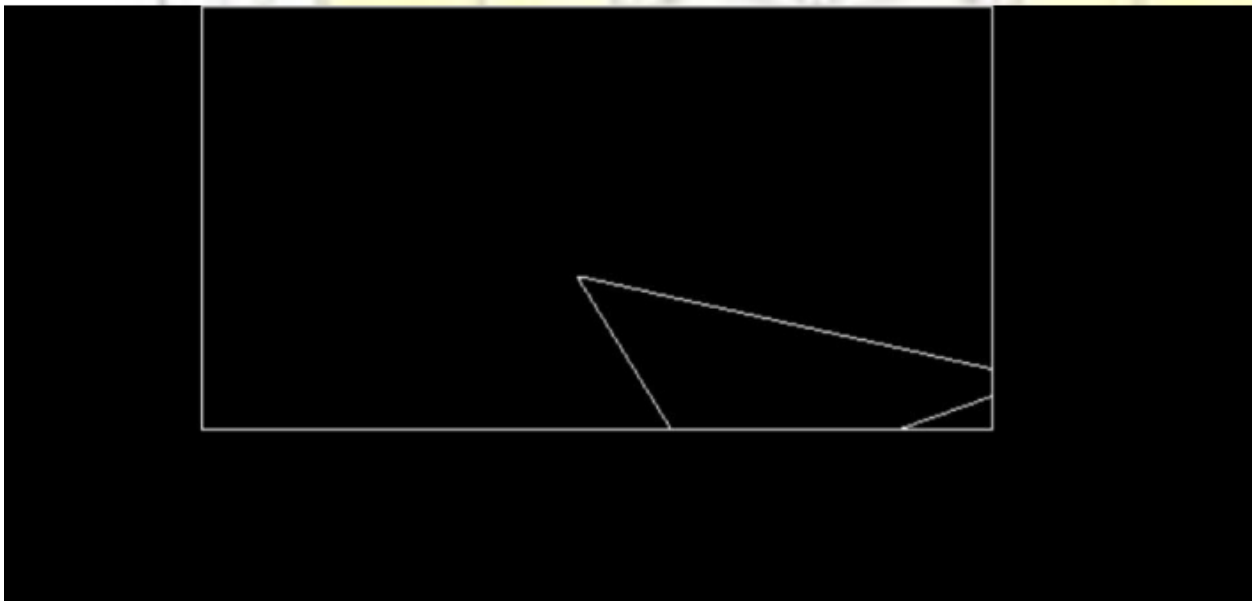
```
}
p[n] = p[0]; hidemouseptr( );
line( p[n-1].x, p[n-1].y, p[n].x, p[n].y ); showmouseptr( ); getmousepos( &bc, &xc, &yc );
flag = 1; bc = 0; while( bc != 2 )
{
if( ( bc == 1 ) && ( flag == 1 ) )
{
xl = xc; yt = yc;
flag = 2;
}
else
{
}


xr = xc; yb = yc;



getmousepos( &bc, &xc, &yc );
}

rectangle( xl, yt, xr, yb ); getch( );

for(b=left; b <= top; b++)
{
cou = -1;



for( i = 0; i < n; i++ )
if( ( inside( p[i], b ) == 0 ) && ( inside( p[i + 1], b ) == 1 ) ){1 ) )) == 0 ) )
 else
}
else

z = intersect( p[i], p[i + 1], b ); pout[++cou] = z;
pout[++cou] = p[i + 1];



if( ( inside( p[i], b ) == 1 ) && ( inside( p[i + 1], b ) == pout[++cou] = p[i + 1];
if( ( inside( p[i], b ) == 1 ) && ( inside( p[i + 1], b

{
z = intersect( p[i], p[i + 1], b ); pout[++cou] = z;

}

pout[++cou] = pout[0]; n = cou;

for( i = 0; i <= n; i++ )  p[i] = pout[i];
}
getch( ); cleardevice( );
```

```
rectangle( xl, yt, xr, yb );

for( i = 0; i < n; i++ )
line( p[i].x, p[i].y, p[i + 1].x, p[i + 1].y );

for( i = 0; i < n; i++ )
{

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

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

Before clipping



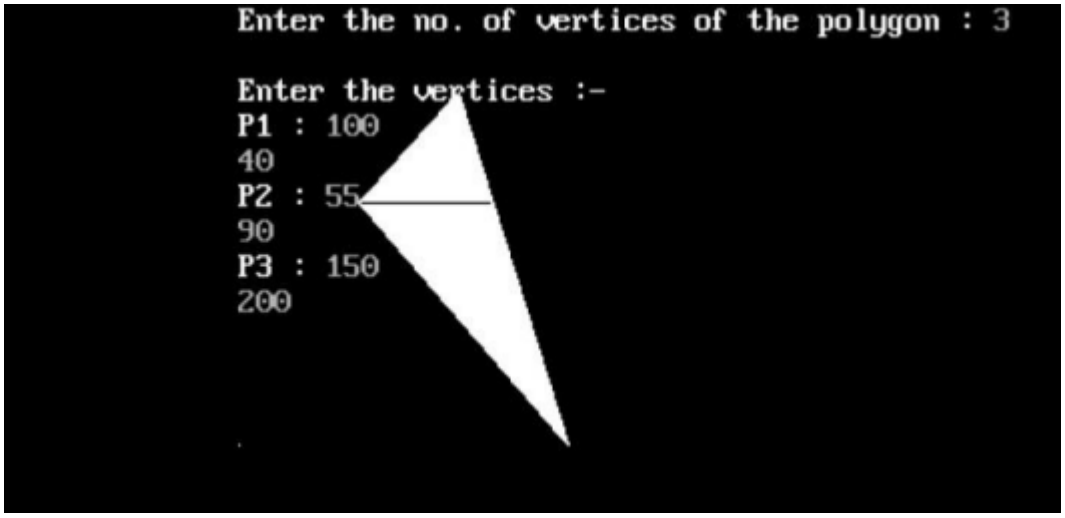
After clipping



Q5. Write a program to fill a polygon using Scan line fill algorithm.
Program

```
#include<iostream.h> #include<conio.h> #include<graphics.h> #include<dos.h> struct edge{
int x1,y1,x2,y2,flag;
};
void main(){ int gd=DETECT,gm,n,i,j,k; edge ed[10], temped;
float dx,dy,m[10],x_int[10],inter_x[10]; int x[10],y[10],ymax=0,ymin=480,yy,temp;
initgraph(&gd,&gm,"C:\\TURBOC3\\BGI")
; cout<<"Enter the no. of vertices of the polygon : "; cin>>n;
cout<<"\nEnter the vertices :- \n"; for(i=0;i<n;i++){ cout<<"P"<<i+1<<" : ";
cin>>x[i]>>y[i]; if(y[i]>ymax)
ymax=y[i]; if(y[i]<ymin)

ymin=y[i]; ed[i].x1=x[i]; ed[i].y1=y[i];
}
for(i=0;i<n-1;i++){ ed[i].x2=ed[i+1].x1; ed[i].y2=ed[i+1].y1;
ed[i].flag=0;
}

ed[i].x2=ed[0].x1;
ed[i].y2=ed[0].y1; ed[i].flag=0; for(i=0;i<n;i++){ if(ed[i].y1
< ed[i].y2){ temp=ed[i].x1; ed[i].x1=ed[i].x2; ed[i].x2=temp; temp=ed[i].y1; ed[i].y1=ed[i].y2;
ed[i].y2=temp;
}
}
for(i=0;i<n;i++){
line(ed[i].x1, ed[i].y1,ed[i].x2,ed[i].y2);
}
for(i=0;i<n-1;i++){
for(j=0;j<n-1;j++){ if(ed[j].y1<ed[j+1].y1){ temped=ed[j]; ed[j]=ed[j+1]; ed[j+1]=temped;
}
if(ed[j].y1==ed[j+1].y1){
if(ed[j].y2<ed[j+1].y2){ temped=ed[j]; ed[j]=ed[j+1]; ed[j+1]=temped;
}

if(ed[j].y2==ed[j+1].y2){

if(ed[j].x1<ed[j+1].x1){ temped=ed[j]; ed[j]=ed[j+1]; ed[j+1]=temped;
}
}
}
}
}

for(i=0;i<n;i++){ dx=ed[i].x2-ed[i].x1;
dy=ed[i].y2-ed[i].y1;
if(dy==0){ m[i]=0;
}
else { m[i]=dx/dy;
```

```
} inter_x[i]=ed[i].x1;
}
yy=ymax; while(yy>ymin){ for(i=0;i<n;i++) { if(yy>ed[i].y2 && yy<=ed[i].y1){
ed[i].flag=1;
}
else{ ed[i].flag=0;
}
}

j=0; for(i=0;i<n;i++){ if(ed[i].flag==1){

if(yy==ed[i].y1){

x_int[j]==ed[i].x1; j++;
if(ed[i-1].y1==yy && ed[i-1].y1<yy) { x_int[j]=ed[i].x1;

j++;
}
if(ed[i+1].y1==yy && ed[i+1].y1<yy){ x_int[j]=ed[i].x1; j++;
}
}
else { x_int[j]=inter_x[i]+(-m[i]); inter_x[i]=x_int[j];
j++;
}
}
}
for(i=0;i<j;i++){ for(k=0;k<j-1;k++){ if(x_int[k]>x_int[k+1]){ temp=(int)x_int[k]; x_int[k]=x_int[k+1];

x_int[k+1]=temp;
}
}
} for(i=0;i<j;i=i+2){ line((int)x_int[i],yy,(int)x_int[i+1],yy);
}
yy--;
}
getch();
}
```



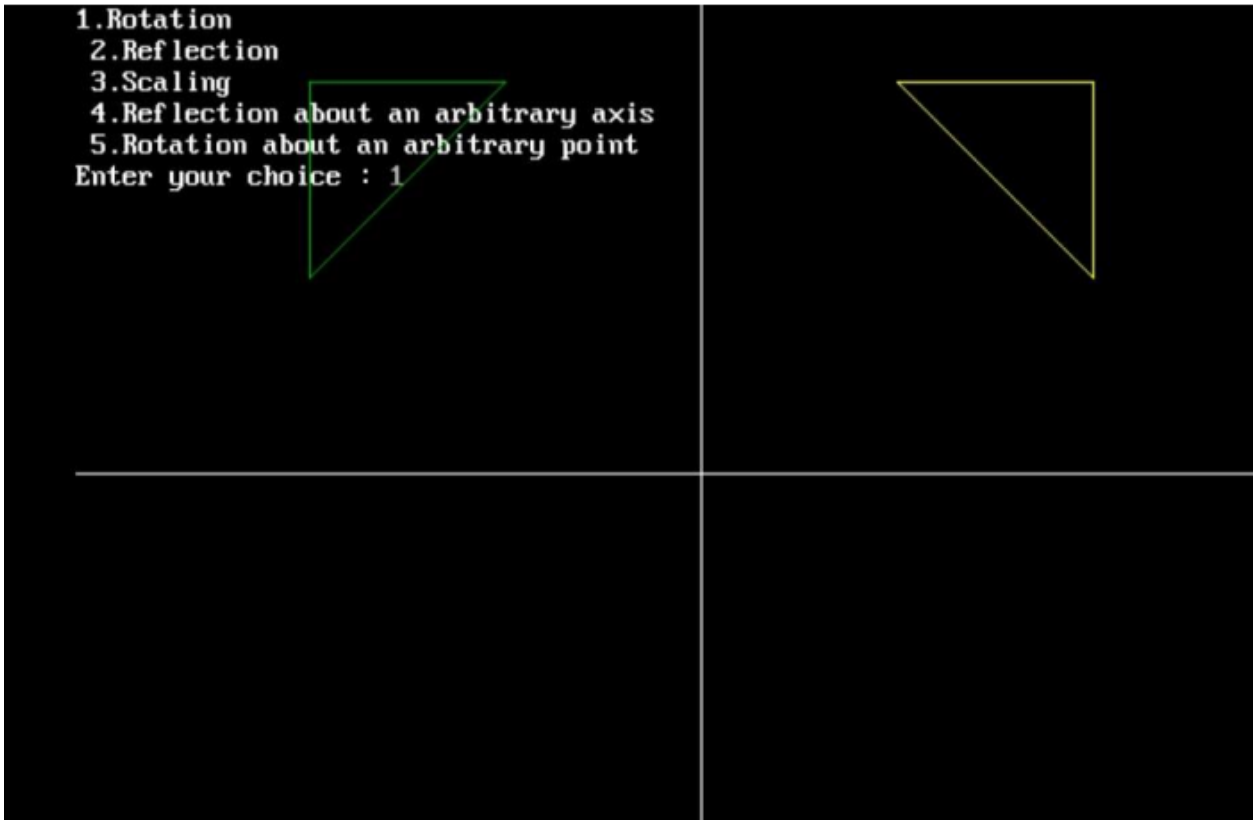
Q6.Write a program to apply various 2D transformations on a 2D object.

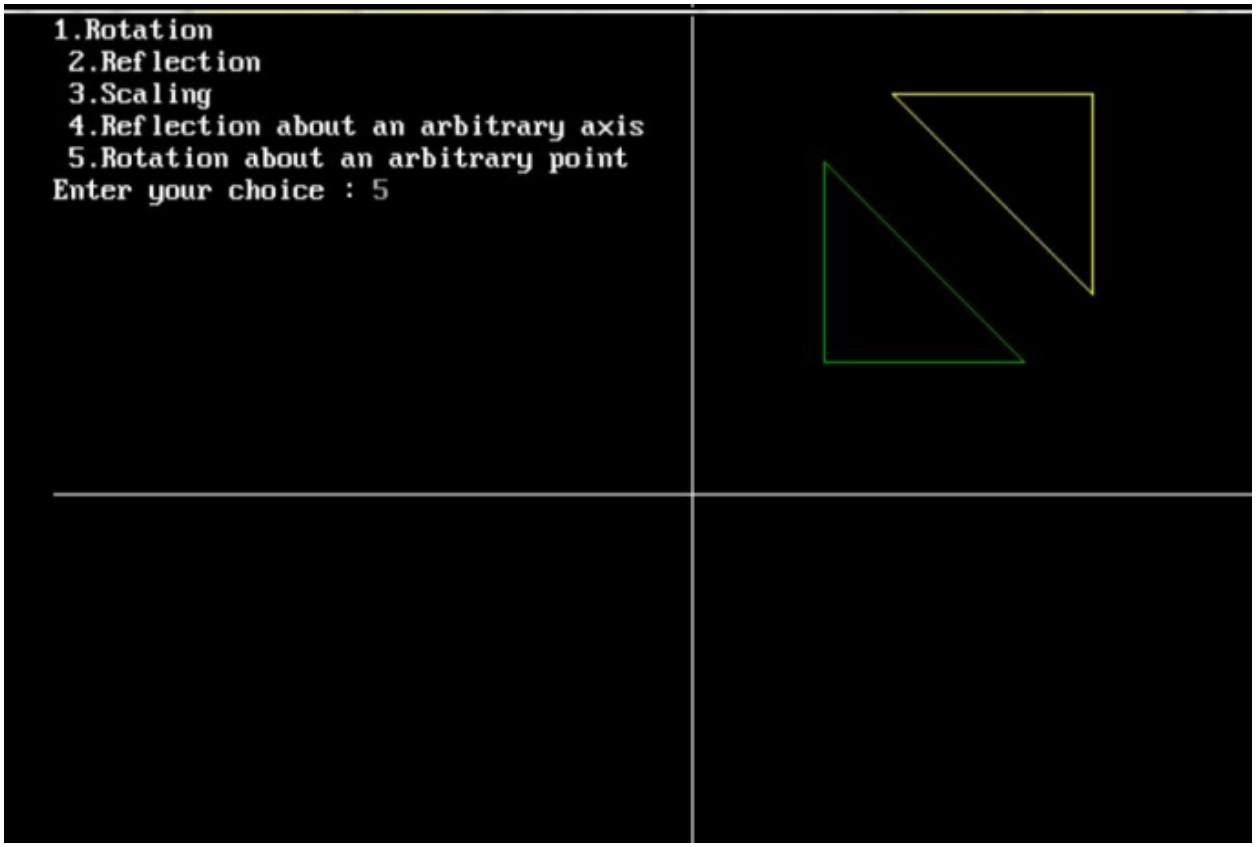
Program

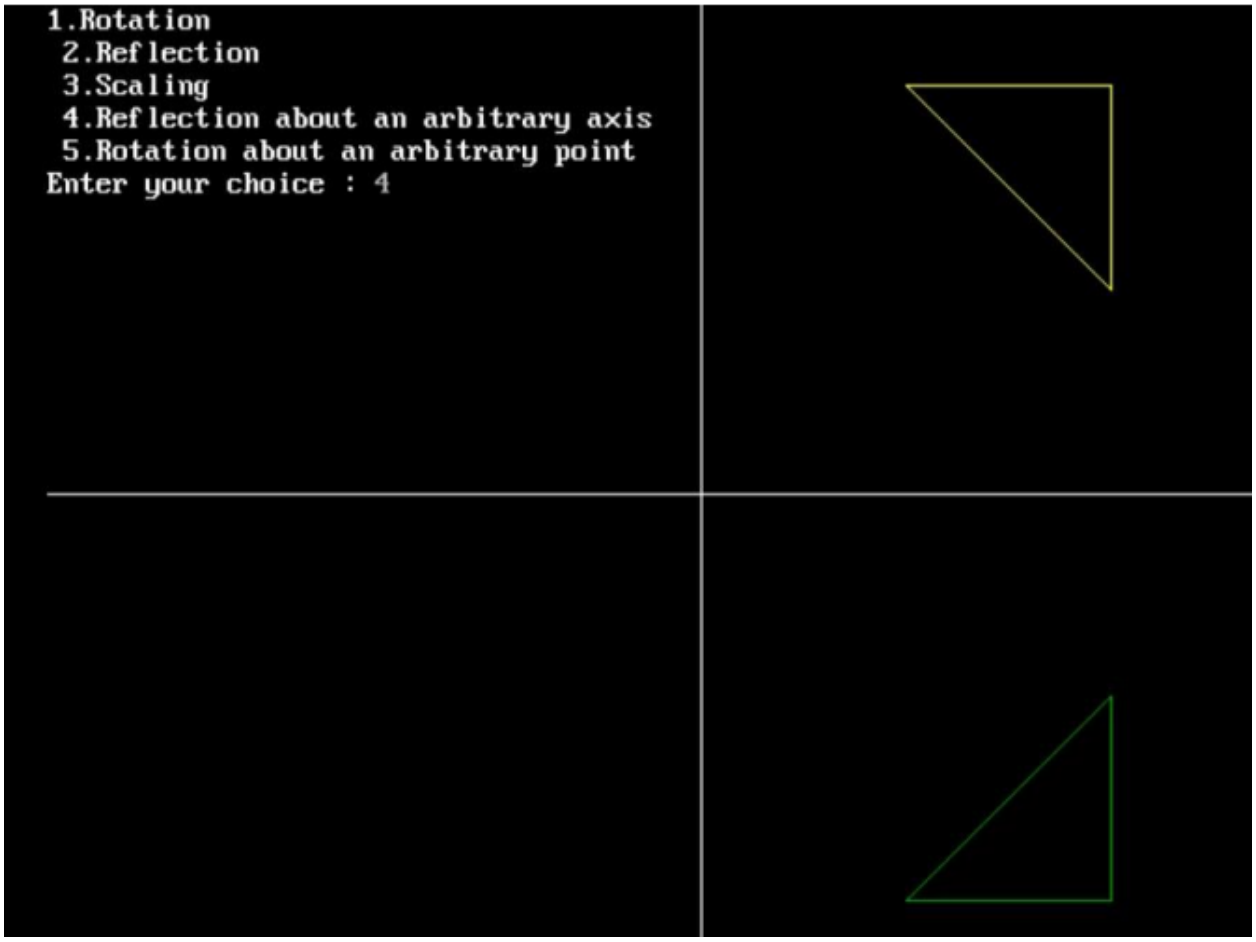
```
#include<graphics.h> #include<stdlib.h> #include<stdio.h> #include<iostream.h>
#include<conio.h> #include<math.h> int mat[3][3];
void dda_line(int x1 , int y1 , int x2 , int y2 , int col){ int dx , dy , st; dx = x2 - x1; dy = y2 - y1; float
y , x
, xinc , yinc; int xmid , ymid; xmid = getmaxx()/2; ymid = getmaxy()/2;
if(abs(dx) > abs(dy)){ st = abs(dx);
}

else{ st = abs(dy);
}

xinc = dx / st; yinc = dy / st; x = x1; y = y1; for(int i=0 ; i<st ; i++){ x += xinc; y += yinc;
putpixel(ceil(x) + xmid , ymid - ceil(y),col);
}
}
void rotate(){ int xmid , ymid; xmid = getmaxx()/2; ymid = getmaxy()/2; line(xmid , 0 , xmid
, getmaxy()); line(0 , ymid ,
getmaxx() , ymid); int c[3][2] ,l , m, i , j , k;
int a[3][2]={{200,200},{200,100},{100,200}};
int t[2][2]={{0,1},{-1,0}};
for( i = 0 ; i < 3 ; i++){ for(j=0 ; j<2 ; j++){ c[i][j]=0;
}
}

dda_line(a[0][0],a[0][1],a[1][0],a[1][1],YELLOW);
dda_line(a[1][0],a[1][1],a[2][0],a[2][1],YELLOW);
dda_line(a[2][0],a[2][1],a[0][0],a[0][1],YELLOW); for ( i=0;i<3;i++){ for ( j=0;j<2;j++){ for (
k=0;k<2;k++){
c[i][j]=c[i][j]+(a[i][k]*t[k][j]);
}
}
} dda_line(c[0][0],c[0][1],c[1][0],c[1][1],GREEN);
dda_line(c[1][0],c[1][1],c[2][0],c[2][1],GREEN);
dda_line(c[2][0],c[2][1],c[0][0],c[0][1],GREEN);

}
void reflection(){ int xmid , ymid; xmid = getmaxx()/2; ymid = getmaxy()/2; line(xmid , 0 , xmid
, getmaxy()); line(0 , ymid ,
getmaxx() , ymid); int c[3][2] ,l , m, i , j , k;
int a[3][2]={{200,200},{200,100},{100,200}};
int t[2][2]={{0,-1},{-1,0}};
for( i = 0 ; i < 3 ; i++){

for(j=0 ; j<2 ; j++){ c[i][j]=0;
}
```

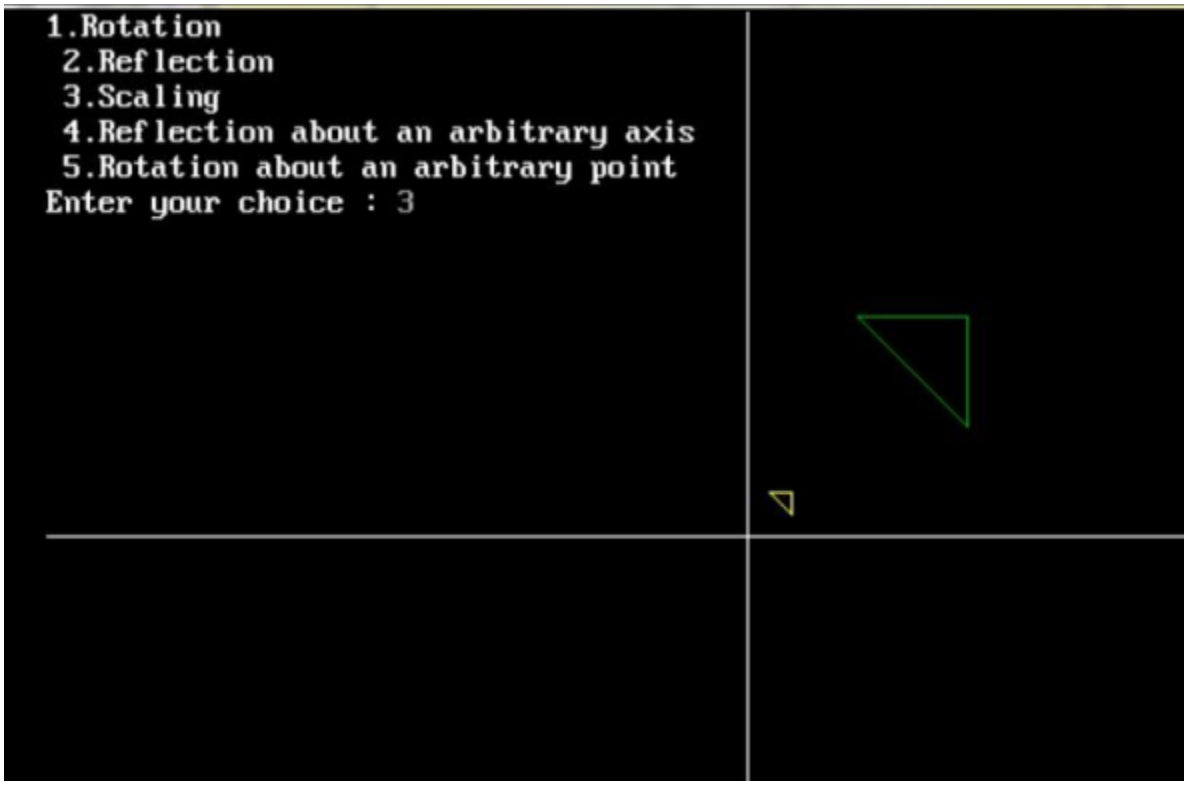
```
} dda_line(a[0][0],a[0][1],a[1][0],a[1][1],YELLOW);
dda_line(a[1][0],a[1][1],a[2][0],a[2][1],YELLOW);
dda_line(a[2][0],a[2][1],a[0][0],a[0][1],YELLOW);
for ( i=0;i<3;i++){ for ( j=0;j<2;j++){ for ( k=0;k<2;k++){
c[i][j]=c[i][j]+(a[i][k]*t[k][j]);
}
}
} dda_line(c[0][0],c[0][1],c[1][0],c[1][1],GREEN);
dda_line(c[1][0],c[1][1],c[2][0],c[2][1],GREEN);
dda_line(c[2][0],c[2][1],c[0][0],c[0][1],GREEN);
}
void scaling(){ int xmid , ymid; xmid = getmaxx()/2; ymid = getmaxy()/2; line(xmid , 0 , xmid
, getmaxy()); line(0 , ymid , getmaxx() , ymid);

int c[3][2] ,l , m, i , j , k; int a[3][2]={{20,20},{20,10},{10,20}};
int t[2][2]={{5,0},{0,5}}; for(
i = 0 ; i < 3 ; i++){ for(j=0 ; j<2 ; j++){ c[i][j]=0;
}
} dda_line(a[0][0],a[0][1],a[1][0],a[1][1],YELLOW);
dda_line(a[1][0],a[1][1],a[2][0],a[2][1],YELLOW);
dda_line(a[2][0],a[2][1],a[0][0],a[0][1],YELLOW);
for ( i=0;i<3;i++){ for ( j=0;j<2;j++){ for ( k=0;k<2;k++){
c[i][j]=c[i][j]+(a[i][k]*t[k][j]);
}
}
} dda_line(c[0][0],c[0][1],c[1][0],c[1][1],GREEN);
dda_line(c[1][0],c[1][1],c[2][0],c[2][1],GREEN);
dda_line(c[2][0],c[2][1],c[0][0],c[0][1],GREEN);
}
void multi(int a[3][3] , int b[3][3] ){ int i , j ,k;

int c[3][3]; for( i = 0 ; i
< 3 ; i++){ for(j=0 ; j< 3 ; j++){ c[i][j]=0;
}
} for ( i=0;i<3;i++){ for ( j=0;j<3;j++){
for ( k=0;k<3;k++){ c[i][j]=c[i][j]+(a[i][k]*b[k][j]);
}
} }

for( i = 0 ; i < 3 ; i++){ for(j=0 ; j< 3 ; j++){ mat[i][j]=c[i][j];
}
}
}
void reflection_arbitrary(){ int xmid , ymid; xmid = getmaxx()/2; ymid = getmaxy()/2; line(xmid , 0
, xmid
, getmaxy());

line(0 , ymid , getmaxx() , ymid); int a[3][3]={{200,200,1},{200,100,1},{100,200,1}};
int t[3][3]={{1,0,0},{0,1,0},{0,0,1}}; int r[3][3]={{-
1,0,0},{0,-1,0},{0,0,1}}; int ref[3][3]={{1,0,0},{0,-
1,0},{0,0,1}}; int rinv[3][3]={{-1,0,0},{0,-
```

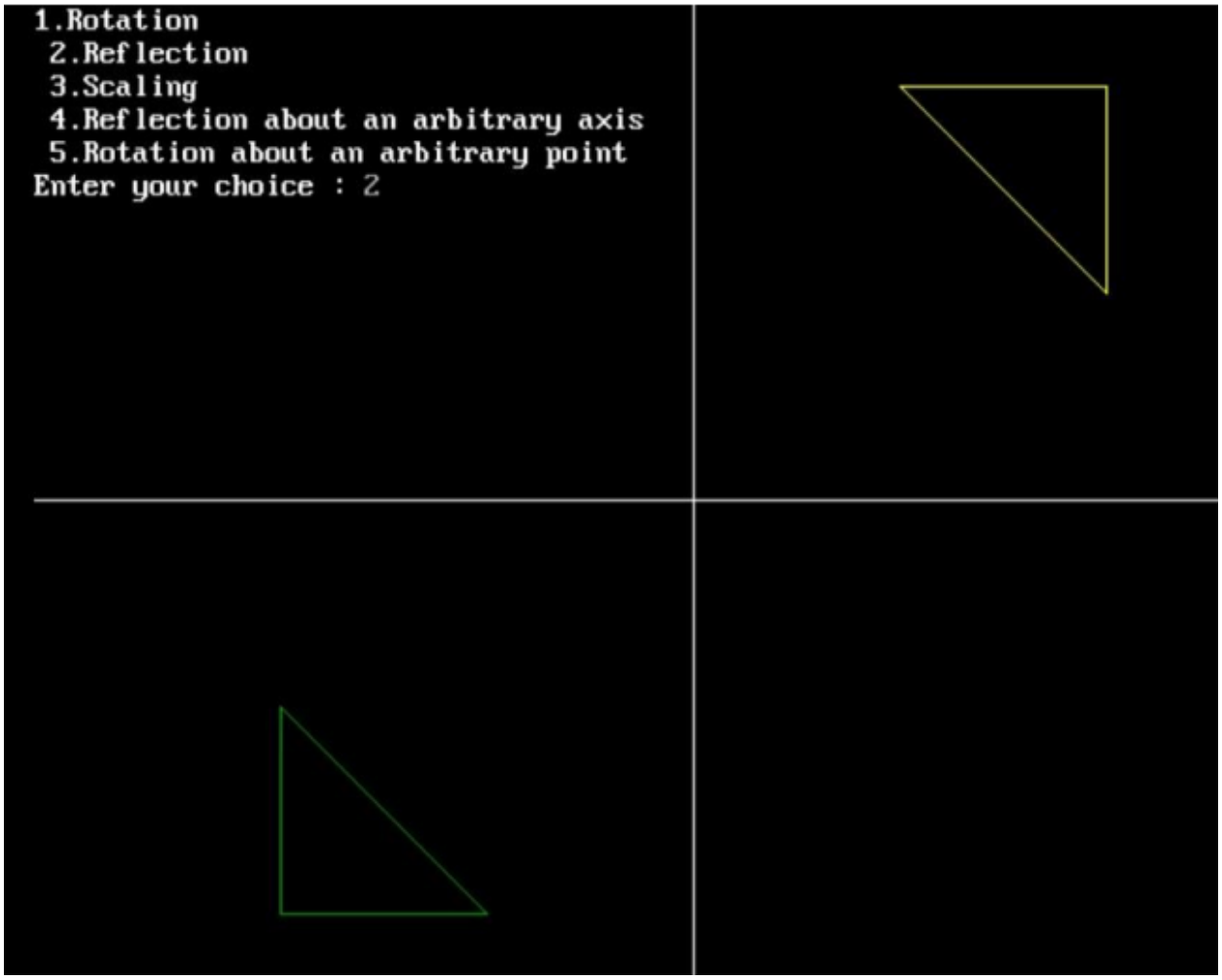
```
1,0},{0,0,1}}; int tinv[3][3]={{1,0,0},{0,1,0},{0,1,1}};
dda_line(a[0][0],a[0][1],a[1][0],a[1][1],YELLOW);
dda_line(a[1][0],a[1][1],a[2][0],a[2][1],YELLOW);
dda_line(a[2][0],a[2][1],a[0][0],a[0][1],YELLOW);
multi(t,r); multi(mat,ref); multi(mat,rinv); multi(mat,tinv); multi(a,mat);
dda_line(mat[0][0],mat[0][1],mat[1][0],mat[1][1], GREEN);
dda_line(mat[1][0],mat[1][1],mat[2][0],mat[2][1], GREEN);
dda_line(mat[2][0],mat[2][1],mat[0][0],mat[0][1], GREEN);
}
void rotation_arbitrary(){ int xmid , ymid; xmid = getmaxx()/2; ymid =

getmaxy()/2; line(xmid , 0 , xmid
, getmaxy());

line(0 , ymid , getmaxx() , ymid);
int c[3][3] , i , j , k; int l[1][3]={{200,200,1}}; int
a[3][3]={{200,200,1},{200,100,1},{100,200,1}}; int
t[3][3]={{1,0,0},{0,1,0},{-133,-133,1}}; int
r[3][3]={{-1,0,0},{0,-1,0},{0,0,1}}; int
tinv[3][3]={{1,0,0},{0,1,0},{133,133,1}};
dda_line(a[0][0],a[0][1],a[1][0],a[1][1],YELLOW);
dda_line(a[1][0],a[1][1],a[2][0],a[2][1],YELLOW);
dda_line(a[2][0],a[2][1],a[0][0],a[0][1],YELLOW);
multi(t,r); multi(mat,tinv); for( i = 0 ; i < 3 ; i++){ for(j=0 ; j<3 ; j++){ c[i][j]=0;
}
} for ( i=0;i<3;i++){ for ( j=0;j<3;j++){
for ( k=0;k<3;k++){ c[i][j]=c[i][j]+(a[i][k]*mat[k][j]);
}
}
}

dda_line(c[0][0],c[0][1],c[1][0],c[1][1],GREEN);
dda_line(c[1][0],c[1][1],c[2][0],c[2][1],GREEN);
dda_line(c[2][0],c[2][1],c[0][0],c[0][1],GREEN);
}

void main(){ clrscr();
int gdriver = DETECT , gmode , errorcode; initgraph(&gdriver, &gmode, "C:\\TURBOC3\\BGI");
int n , m;

cout<<" 1.Rotation \n 2.Reflection \n 3.Scaling \n 4.Reflection about an arbitrary axis \n";
cout<<" 5.Rotation about an arbitrary point\n"; cout<<"Enter your choice : "; cin>>n; switch(n){
case 1 : rotate(); break; case 2 : reflection(); break; case 3 : scaling(); break;
case 4 : reflection_arbitrary(); break;

case 5 : rotation_arbitrary(); break; default : cout<<"Invalid Choice\n";
}
getch();
}
```


1.Rotation
2.Reflection
3.Scaling
4.Reflection about an arbitrary axis
5.Rotation about an arbitrary point
Enter your choice : 1


1.Rotation
2.Reflection
3.Scaling
4.Reflection about an arbitrary axis
5.Rotation about an arbitrary point
Enter your choice : 5


1.Rotation
2.Reflection
3.Scaling
4.Reflection about an arbitrary axis
5.Rotation about an arbitrary point
Enter your choice : 4


1.Rotation
2.Reflection
3.Scaling
4.Reflection about an arbitrary axis
5.Rotation about an arbitrary point
Enter your choice : 3



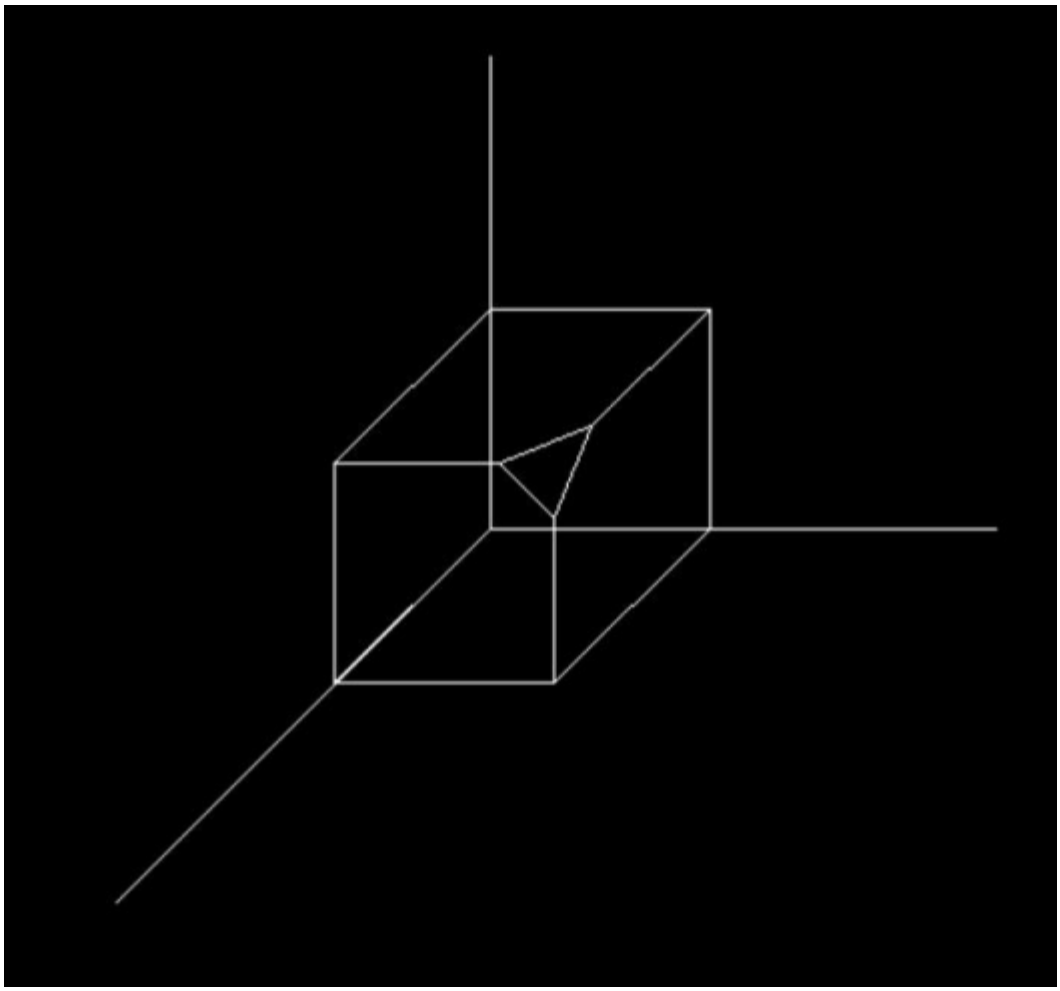
Q7. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.

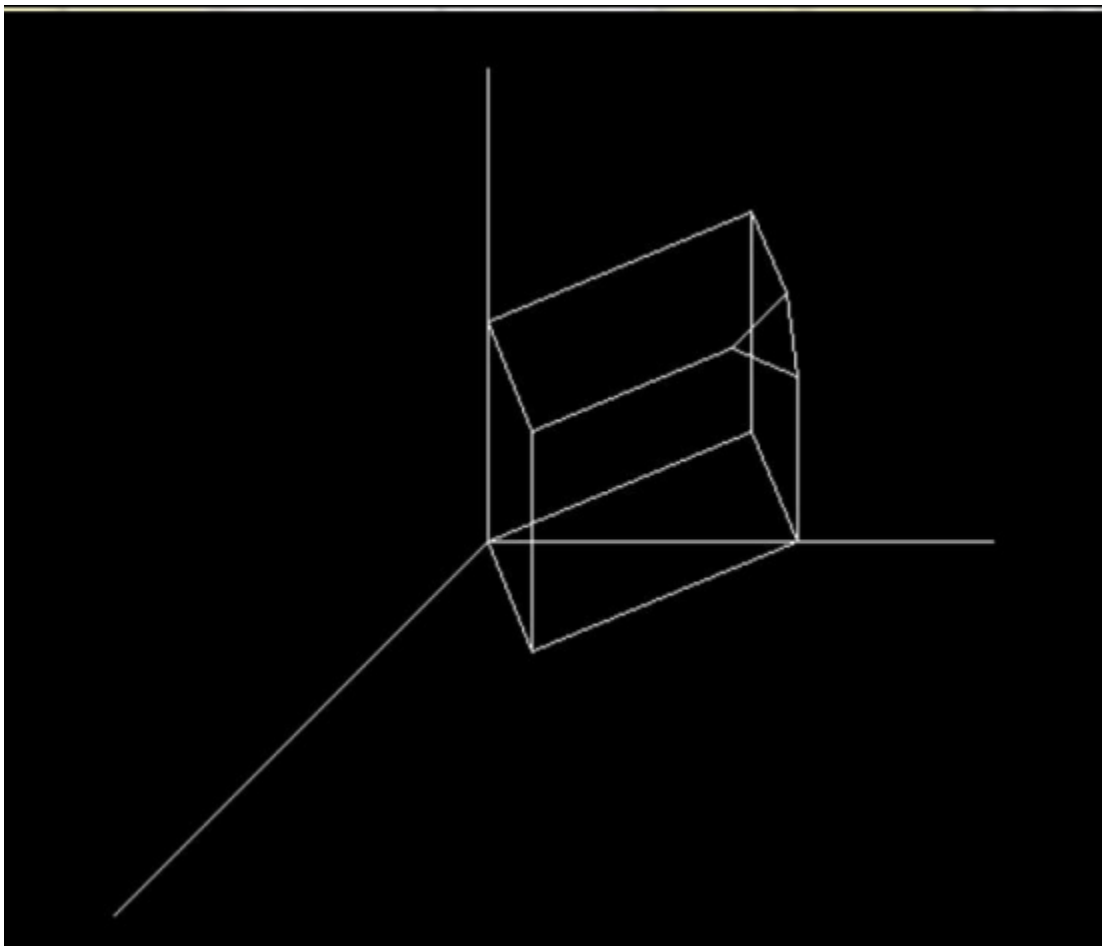
Program

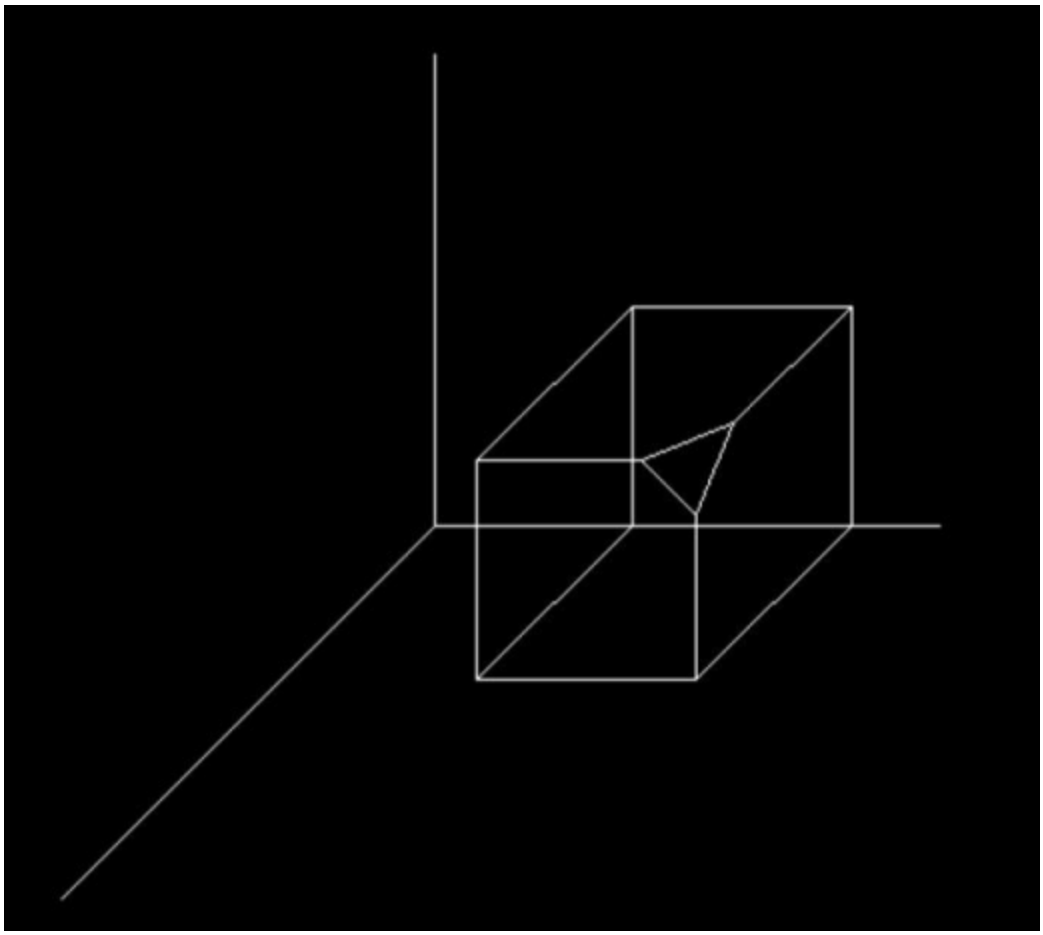
```
#include<iostream.h> #include<dos.h> #include<stdio.h> #include<math.h> #include<conio.h>
#include<graphics.h> #include<process.h> double x1,x2,y1,y2;
void draw_cube(double edge[20][3]){ int i;
cleardevice(); for(i=0;i<19;i++){
x1=edge[i][0]+edge[i][2]*(cos(2.3562)); y1=edge[i][1]-
edge[i][2]*(sin(2.3562)); x2=edge[i+1][0]+edge[i+1][2]*(cos(2.3562));
y2=edge[i+1][1]-edge[i+1][2]*(sin(2.3562));
line(x1+320,240-y1,x2+320,240-y2);
} line(320,240,320,25); line(320,240,550,240);

line(320,240,150,410);
}

void translate(double edge[20][3]){ int a,b,c; int
i;
cout<<"Enter the Translation Factors : "; cin>>a>>b>>c;
cleardevice(); for(i=0;i<20;i++){ edge[i][0]+=a; edge[i][0]+=b; edge[i][0]+=c;
}
draw_cube(edge);
```

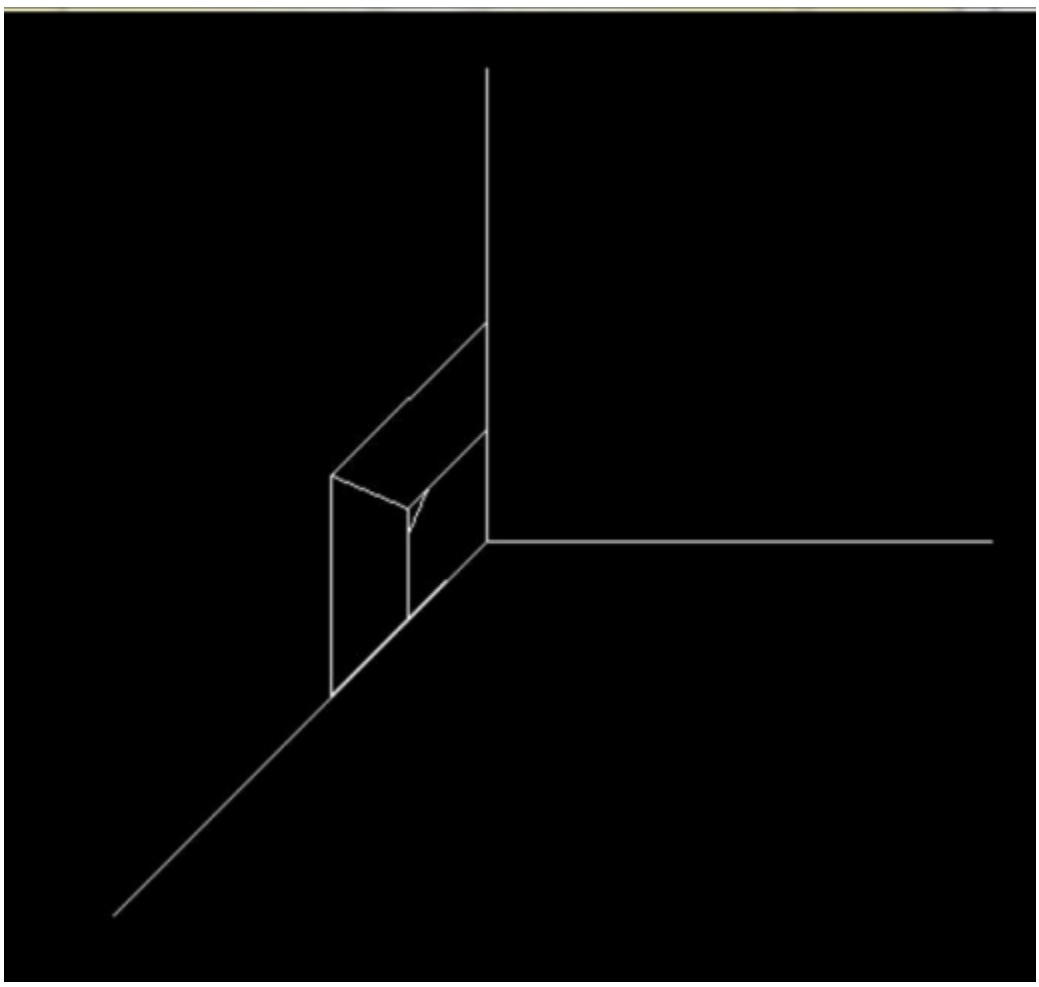
```
}
void rotate(double edge[20][3]){ int n;
int i;
double temp,theta,temp1; cleardevice(); cout<<" 1.X-Axis \n 2.Y-Axis \n 3.Z-Axis \n";
cout<<"Enter your choice : "; cin>>n;

switch(n){
case 1: cout<<" Enter The Angle "; cin>>theta; theta=(theta*3.14)/180; for(i=0;i<20;i++){
edge[i][0]=edge[i][0]; temp=edge[i][1]; temp1=edge[i][2];
edge[i][1]=temp*cos(theta)-temp1*sin(theta); edge[i][2]=temp*sin(theta)+temp1*cos(theta);
}
draw_cube(edge); break;
case 2: cout<<" Enter The Angle "; cin>>theta; theta=(theta*3.14)/180; for(i=0;i<20;i++){
edge[i][1]=edge[i][1];
temp=edge[i][0]; temp1=edge[i][2]; edge[i][0]=temp*cos(theta)+temp1*sin(theta)
;
edge[i][2]=-temp*sin(theta)+temp1*cos(theta);
}
draw_cube(edge);

break;
case 3: cout<<" Enter The Angle "; cin>>theta; theta=(theta*3.14)/180; for(i=0;i<20;i++){
edge[i][2]=edge[i][2];
temp=edge[i][0]; temp1=edge[i][1]; edge[i][0]=temp*cos(theta)-temp1*sin(theta);
edge[i][1]=temp*sin(theta)+temp1*cos(theta);
}
draw_cube(edge); break;
}
}
void reflect(double edge[20][3]){ int n;
int i; cleardevice();
cout<<" 1.X-Axis \n 2.Y-Axis \n 3.Z-Axis \n"; cout<<" Enter Your Choice : "; cin>>n; switch(n){
case 1: for(i=0;i<20;i++){

edge[i][0]=edge[i][0]; edge[i][1]=-edge[i][1]; edge[i][2]=-edge[i][2];
}
draw_cube(edge); break; case 2: for(i=0;i<20;i++){ edge[i][1]=edge[i][1];
edge[i][0]=-edge[i][0];
edge[i][2]=-edge[i][2];
}
draw_cube(edge); break; case 3: for(i=0;i<20;i++){ edge[i][2]=edge[i][2];
edge[i][0]=-edge[i][0];
edge[i][1]=-edge[i][1];
}
draw_cube(edge); break;
}
}
void perspect(double edge[20][3]){ int n;

int i;
```

```
double p,q,r; cleardevice(); cout<<" 1.X- Axis \n 2.Y-Axis \n 3.Z-Axis\n"; cout<<" Enter Your
Choice : "; cin>>n; switch(n){ case 1: cout<<" Enter P : "; cin>>p; for(i=0;i<20;i++){
edge[i][0]=edge[i][0]/(p*edge[i][0]+1);
edge[i][1]=edge[i][1]/(p*edge[i][0]+1);
edge[i][2]=edge[i][2]/(p*edge[i][0]+1);
}
draw_cube(edge); break; case 2: cout<<" Enter Q : "; cin>>q; for(i=0;i<20;i++){
edge[i][1]=edge[i][1]/(edge[i][1]*q+1);
edge[i][0]=edge[i][0]/(edge[i][1]*q+1);
edge[i][2]=edge[i][2]/(edge[i][1]*q+1);
}
draw_cube(edge);

break; case 3: cout<<" Enter R : "; cin>>r; for(i=0;i<20;i++){ edge[i][2]=edge[i][2]/(edge[i][2]*r+1);
edge[i][0]=edge[i][0]/(edge[i][2]*r+1);
edge[i][1]=edge[i][1]/(edge[i][2]*r+1);
}
draw_cube(edge); break;
}
}
void main(){ clrscr();
int gdriver = DETECT , gmode , errorcode; initgraph(&gdriver, &gmode, "C:\\TURBOC3\\BGI");
int n;
double edge[20][3]={100,0,0,100,100,0,0,100,0,0,100,100,0,0,100,0,0,0,100, 0,0,

100,0,100,100,75,100,75,100,100,100,100,75,100,100,0,100,100,75,

100,75,100,75,100,100,0,100,100,0,100,0,0,0,0,0,0,100,100,0,100};
cout<<" 1.Draw Cube \n 2.Rotation \n 3.Reflection \n";

cout<<" 4.Translation \n 5.Perspective Projection \n"; cout<<" Enter Your Choice : "; cin>>n;
switch(n){ case 1: draw_cube(edge);
break; case 2: rotate(edge); break;
case 3: reflect(edge); break; case 4: translate(edge); break; case 5: perspect(edge); break;
default: cout<<" Invalid Choice\n ";
}
getch();
}
```







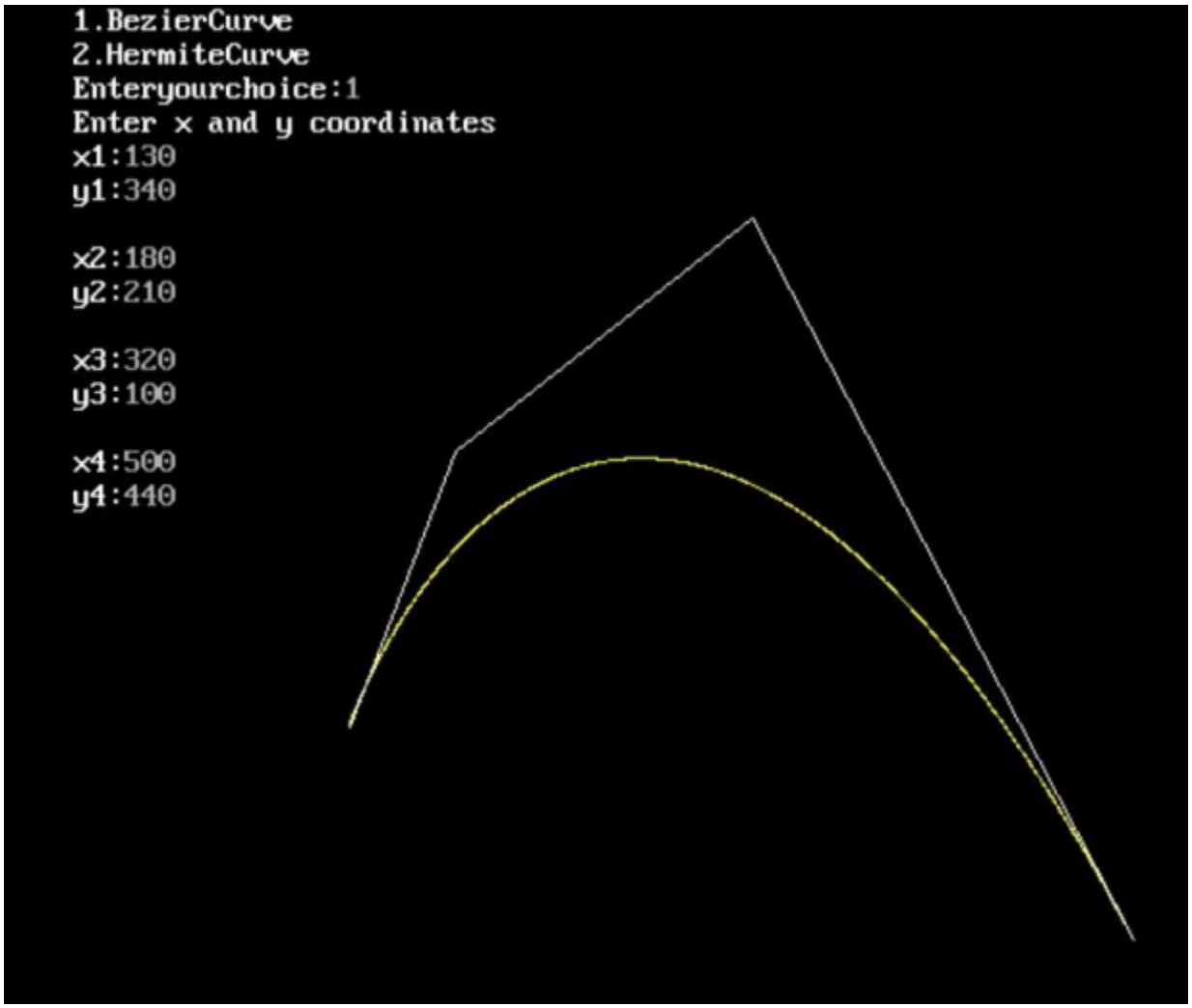


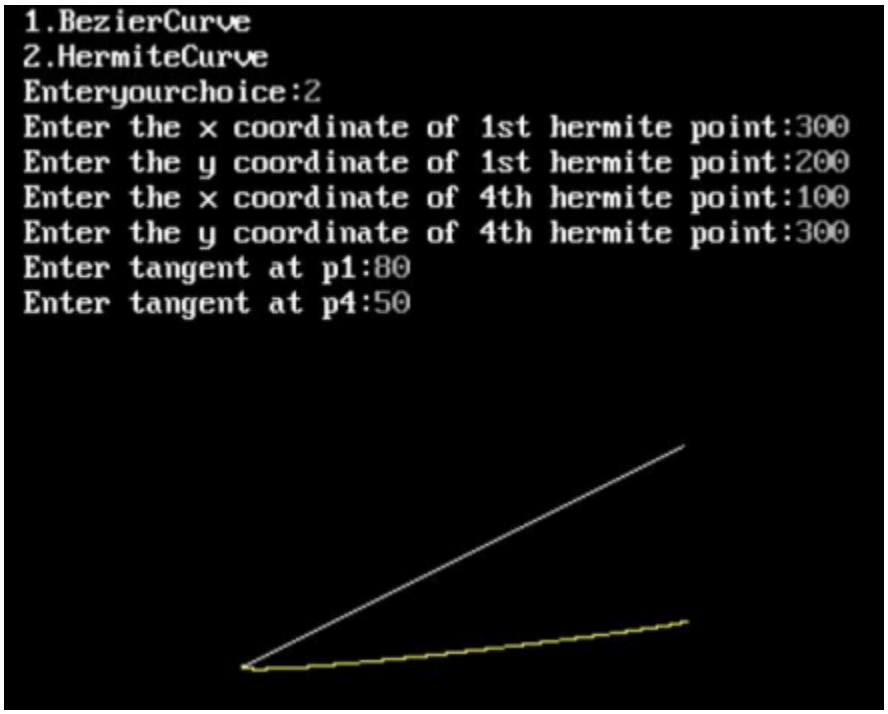
Q8. Write a program to draw Hermite and Bezier curves and implement both.

Program

```
#include<iostream.h> #include<conio.h>

#include<graphics.h> #include<math.h> voidbezier_curve(int x[4],int y[4]){

for(double t=0.0;t<1.0;t=t+0.0005){ Double xt=pow(1-t,3)*x[0]+3*t*pow(1-
t,2)*x[1]+3*pow(t,2)*(1-t)*x[2]+pow(t,3)*x[3]; Double yt=pow(1-t,3)*y[0]+3*t*pow(1-
t,2)*y[1]+3*pow(t,2)*(1-t)*y[2]+pow(t,3)*y[3];

putpixel(xt,yt,YELLOW);
}
for(inti=0;i<3;i++){ line(x[i],y[i],x[i+1],y[i+1]);
}

}
Void hermite_curve(int x1,int y1,int x2,int y2,double t1,double t4){ Float x,y,t;
for(t=0.0;t<=1.0;t+=0.001){

x=(2*t*t*t-3*t*t+1)*x1+(-2*t*t*t+3*t*t)*x2+(t*t*t- 2*t*t+t)*t1+(t*t*t-t*t)*t4;
y=(2*t*t*t-3*t*t+1)*y1+(-2*t*t*t+3*t*t)*y2+(t*t*t- 2*t*t+1)*t1+(t*t*t-t*t)*t4;
putpixel(x,y,YELLOW);
}
putpixel(x1,y1,GREEN); putpixel(x2,y2,GREEN); line(x1,y1,x2,y2);
}
Void main()
{

clrscr();
Int gdriver=DETECT,gmode,errorcode; intx1,y1,x2,y2,n; Double
t1,t4;

initgraph(&gdriver,&gmode,"C:\\TURBOC3\\BGI"); intx[4],y[4];
inti;
cout<<"1.BezierCurve \n 2.HermiteCurve\n"; cout<<"Enter your choice:"; cin>>n; if(n==1){

cout<<"Enter x and y coordinates\n"; for(i=0;i<4;i++){ cout<<"x"<<i+1<<":";
cin>>x[i]; cout<<"y"<<i+1<<":"; cin>>y[i]; cout<<endl;
}
bezier_curve(x,y);
}
elseif(n==2){
cout<<"Enter the x coordinate of 1st hermite point:"; cin>>x1; cout<<"Enter the y coordinate of
1st hermite point:"; cin>>y1; cout<<"Enter the x coordinate of 4th hermite point:"; cin>>x2;
cout<<"Enter the y coordinate of 4th hermite point:"; cin>>y2; cout<<"Enter tangent at p1:";
cin>>t1; cout<<"Enter tangent at p4:"; cin>>t4;
hermite_curve(x1,y1,x2,y2,t1,t4);
}
else{ cout<<"\nInvalid Choice";
```

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


1.BezierCurve
2.HermiteCurve
Enteryourchoice:1
Enter x and y coordinates
x1:130
y1:340
x2:180
y2:210
x3:320
y3:100
x4:500
y4:440


1.BezierCurve
2.HermiteCurve
Enteryourchoice:2
Enter the x coordinate of 1st hermite point:300
Enter the y coordinate of 1st hermite point:200
Enter the x coordinate of 4th hermite point:100
Enter the y coordinate of 4th hermite point:300
Enter tangent at p1:80
Enter tangent at p4:50