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Write a program to draw a line using DDA line generation algorithm.

```
#include<graphics.h>
#include<stdio.h>
#include<conio.h>
#include<math.h>
int main(void)
{
int gdriver=DETECT,gmode;
int x1,x2,y1,y2;
float a,b;
int i=1,dx,dy,steps;
float x,y;
initgraph(&gdriver,&gmode," ");
printf("enter the values of x1 and y1");
scanf("%d%d",&x1,&y1);
printf("enter the values of x2 and y2");
scanf("%d%d",&x2,&y2);
dx=abs(x2-x1);
printf("dx=%d",dx);
dy=abs(y2-y1);
printf("dy=%d",dy);
if(dx>dy)
{
steps=dx;
}
else
{
steps=dy;
}
printf("no.of steps=%d",steps);
x=dx/steps;
y=dy/steps;
while(i<=steps)
{
a=a+x;
b=b+y;
putpixel(a,b,RED);
i++;
}
getch();
return(0);
}
```

Output

```
enter the values of x1 and y1
00
00
enter the values of x2 and y2
100
100
dx=100dy=100no.of steps=100
```

Write a program to draw a line using Bresenham's line generation algorithm.

```
#include<graphics.h>
#include<stdio.h>
#include<math.h>
#include<conio.h>
int main(void)
{
int gdriver=DETECT,gmode;
int x1,x2,y1,y2,dx,dy,p,x,y;
initgraph(&gdriver,&gmode," ");
printf("enter the value of x1 and y1");
scanf("%d%d",&x1,&y1);
printf("enter the value of x2 and y2");
scanf("%d%d",&x2,&y2);
dx=x2-x1;
dy=y2-y1;
p=2*dy-dx;
x=x1;
y=y1;
putpixel(x,y,WHITE);
while(x<=x2)
{
      if(p<0)
      {
            x=x+1;
            y=y;
            p=p+2*dy;
      }
      else
      {
            x=x+1;
            y=y+1;
            p=p+2*dy-2*dx;
      }

putpixel(x,y,WHITE);
}
getch();
return(0);
}
```

Output


enter the value of x1 and y1
100
100
enter the value of x2 and y2
250
250

Write a program to draw a circle using midpoint circle generation algorithm.

```
#include<graphics.h>
#include<stdio.h>
#include<math.h>
#include<conio.h>
int main(void)
{
int gdriver=DETECT,gmode;
int x,y,r,p,xc,yc;
clrscr();
initgraph(&gdriver,&gmode," ");
printf("enter the value of x,y and radius");
scanf("%d%d%d",&xc,&yc,&r);
p=1-r;
x=0;
y=r;
do
{
if(p<0)
{
x=x+1;
y=y;
p=p+(2*x)+1;
}
else
{
x=x+1;
y=y-1;
p=p+(2*x)-(2*y)+1;
}
putpixel(xc+x,yc+y,5);
putpixel(xc-y,yc-x,5);
putpixel(xc+y,yc-x,5);
putpixel(xc-y,yc+x,5);
putpixel(xc+y,yc+x,5);
putpixel(xc-x,yc-y,5);
putpixel(xc+x,yc-y,5);
putpixel(xc-x,yc+y,5);
}
while(x<=y);
getch();
return(0);
}
```

Output:

Write a program to draw a circle using Bresenham's circle generation algorithm.

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

int main(void)
{
int xc,yc,x,y,r,p;
int gdriver=DETECT,gmode;
initgraph(&gdriver,&gmode," ");
printf("enter the center of the circle");
scanf("%d%d",&xc,&yc);
printf("enter the radius of the circle");
scanf("%d",&r);
p=3-2*r;
x=0;
y=r;
do
{
if(p<0)
{
x=x+1;
y=y;
p=p+4*x+1;
}
else
{
x=x+1;
y=y-1;
p=p+4*x-4*y+1;
}
putpixel(xc+x,yc+y,1);
putpixel(xc-y,yc-x,2);
putpixel(xc+y,yc-x,3);
putpixel(xc-y,yc+x,4);
putpixel(xc+y,yc+x,5);
putpixel(xc-x,yc-y,6);
putpixel(xc+x,yc-y,7);
putpixel(xc-x,yc+y,8);
}
while(x<=y);
getch();
return(0);
}
```

Output:

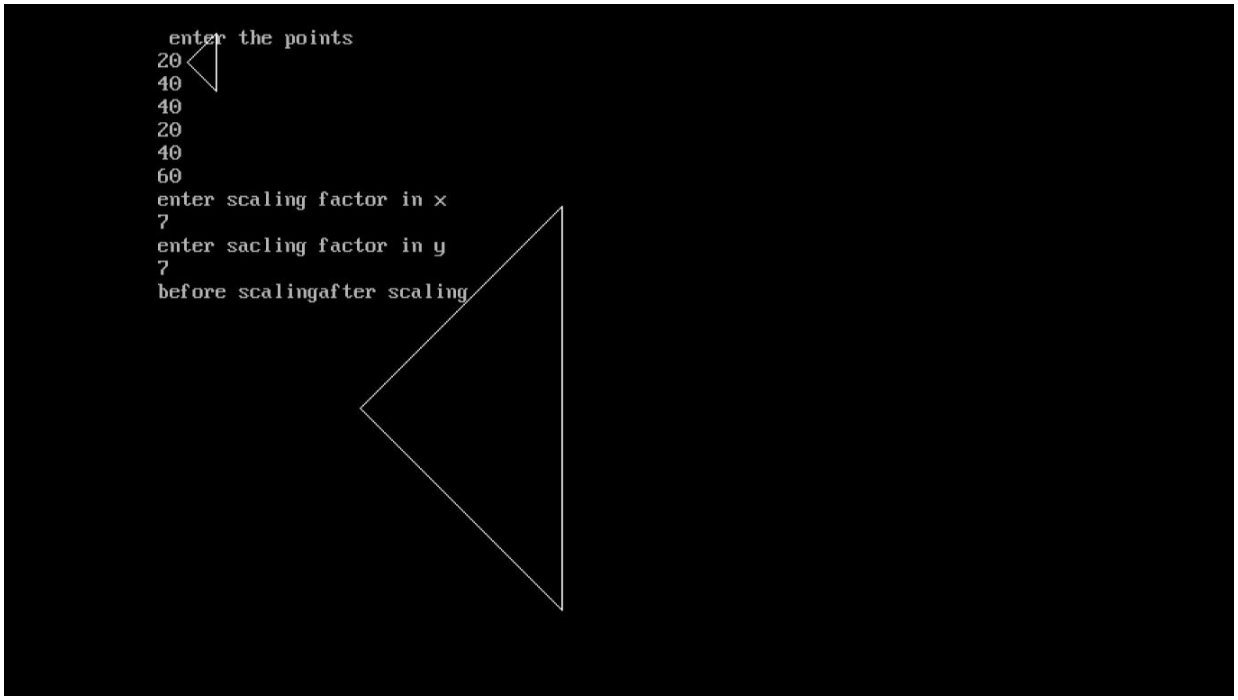

enter the center of the circle
200
200
enter the radius of the circle
100

Write a program to scale a triangle about origin.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
int main(void)
{
int gdriver=DETECT,gmode;
int t[3][3],x[3][3],w[3][3];
int x1,y1,x2,y2,x3,y3,i,j,k,sx,sy;
initgraph(&gdriver,&gmode," ");
printf("\n enter the points");
scanf("%d%d%d%d%d%d",&x1,&y1,&x2,&y2,&x3,&y3);
printf("enter scaling factor in x");
scanf("%d",&sx);
printf("enter scaling factor in y");
scanf("%d",&sy);
printf("before scaling");
line(x1,y1,x2,y2);
line(x2,y2,x3,y3);
line(x1,y1,x3,y3);
t[0][0]=sx;
t[0][1]=0;
t[0][2]=0;
t[1][0]=0;
t[1][1]=sy;
t[1][2]=0;
t[2][0]=0;
t[2][1]=0;
t[2][2]=1;
x[0][0]=x1;
x[1][0]=y1;
x[0][1]=x2;
x[1][1]=y2;
x[0][2]=x3;
x[1][2]=y3;
x[2][0]=1;
x[2][1]=1;
x[2][2]=1;
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
w[i][j]=0;
for(k=0;k<3;k++)
{
```

```
w[i][j]=w[i][j] + t[i][k] * x[k][j];
}
}
}
printf("after scaling");
line(w[0][0],w[1][0],w[0][1],w[1][1]);
line(w[0][0],w[1][0],w[0][2],w[1][2]);
line(w[0][1],w[1][1],w[0][2],w[1][2]);
getch();
return(0);
}
```

Output


enter the points
20
40
40
20
40
60
enter scaling factor in x
7
enter sacling factor in y
7
before scalingafter scaling

Write a program to rotate a triangle.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
#define pi 3.14
int main(void)
{
float t[3][3],r[3][3],o[3][3];
float x1,x2,x3,y1,y2,y3,d,i,j,k;
float a;
int gdriver=DETECT,gmode;
initgraph(&gdriver,&gmode," ");
printf("\n enter the values of triangle");
scanf("%f%f%f%f%f%f",&x1,&y1,&x2,&y2,&x3,&y3);
printf("\n enter the degree of rotation");
scanf("%f",&d);
a=d*(pi/180);
printf("%f",a);
line(x1,y1,x2,y2);
line(x1,y1,x3,y3);
line(x2,y2,x3,y3);
r[0][0]=cos(a);
r[0][1]=sin(a);
r[0][2]=0;
r[1][0]=sin(-a);
r[1][1]=cos(a);
r[1][2]=0;
r[2][0]=0;
r[2][1]=0;
r[2][2]=1;
o[0][0]=x1;
o[0][1]=x2;
o[0][2]=x3;
o[1][0]=y1;
o[1][1]=y2;
o[1][2]=y3;
o[2][0]=1;
o[2][1]=1;
o[2][2]=1;
printf("\n after rotating in clockwise direction");
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
t[i][j]=0;
```

```
for(k=0;k<3;k++)
{
t[i][j]=t[i][j] + r[i][k] * o[k][j];
}
printf("%f \t",t[i][j]);
}
printf("\n");
}
line(t[0][0],t[1][0],t[0][1],t[1][1]);
line(t[0][0],t[1][0],t[0][2],t[1][2]);
line(t[0][1],t[1][1],t[0][2],t[1][2]);
getch();
return(0);
}
```

Output

```
 enter the values of triangle
90
100
60
150
120
150

 enter the degree of rotation
30
0.523333
 after rotating in clockwise direction
127.931236      126.934998      178.904480
41.636509       99.937515       69.951309
1.000000        1.000000        1.000000
```

Write a program to implement 2D reflection of a triangle.

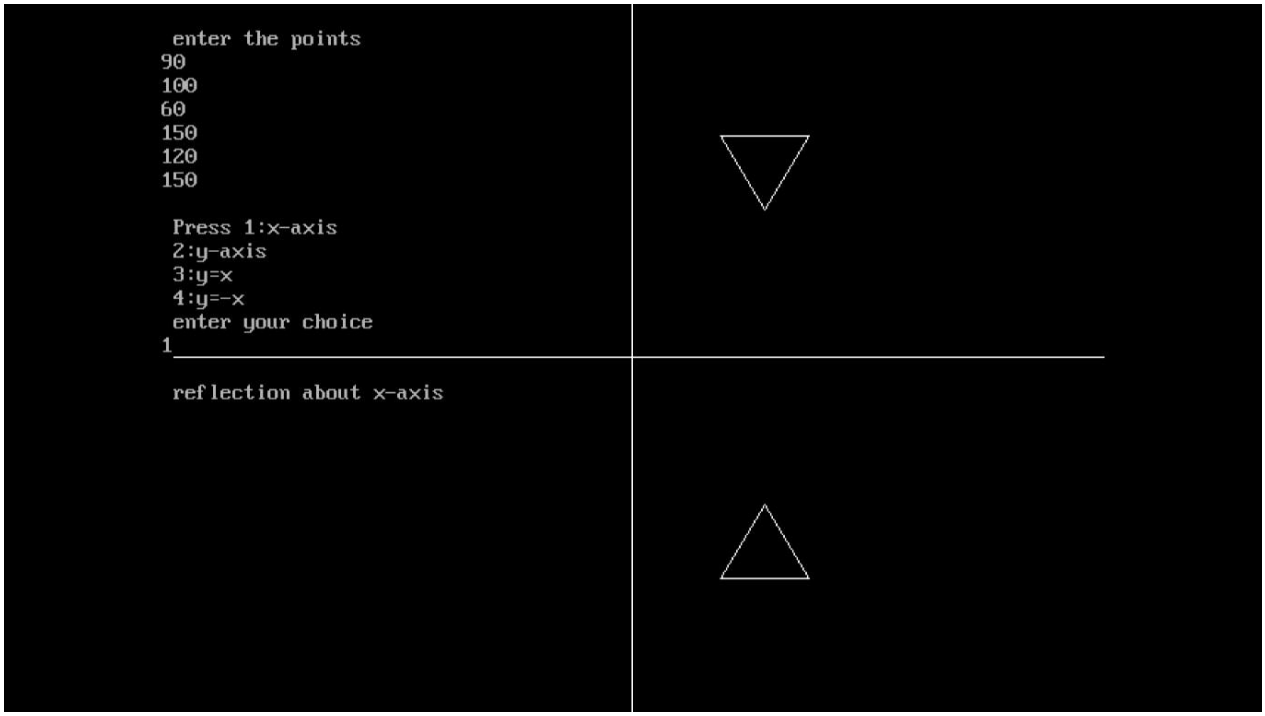
```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
int main(void)
{
int a[3][3],b[3][3],c[3][3];
int ch,x1,y1,x2,y2,x3,y3,i,j,k,x,y,p,q;
int gdriver=DETECT,gmode;
initgraph(&gdriver,&gmode," ");
x=getmaxx()/2;
y=getmaxy()/2;
p=getmaxx();
q=getmaxy();
line(0,y,p,y);
line(x,0,x,q);
printf("\n enter the points");
scanf("%d%d%d%d%d%d",&x1,&y1,&x2,&y2,&x3,&y3);
line(x+x1,y-y1,x+x2,y-y2);
line(x+x1,y-y1,x+x3,y-y3);
line(x+x2,y-y2,x+x3,y-y3);
b[0][0]=x1;
b[0][1]=x2;
b[0][2]=x3;
b[1][0]=y1;
b[1][1]=y2;
b[1][2]=y3;
b[2][0]=1;
b[2][1]=1;
b[2][2]=1;
printf("\n Press 1:x-axis \n 2:y-axis \n 3:y=x \n 4:y=-x");
printf("\n enter your choice");
scanf("%d",&ch);
switch(ch)
{
case 1:
printf("\n reflection about x-axis");
a[0][0]=1;
a[0][1]=0;
a[0][2]=0;
a[1][0]=0;
a[1][1]=-1;
a[1][2]=0;
a[2][0]=0;
a[2][1]=0;
```

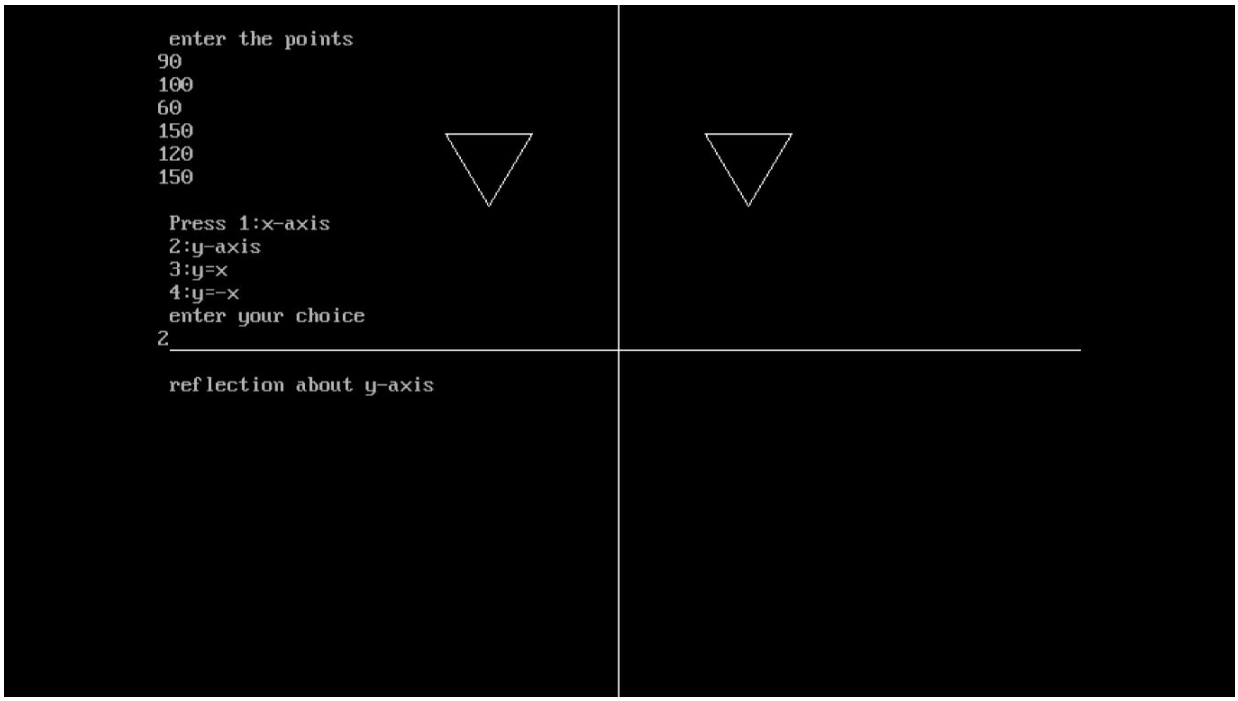
```
a[2][2]=1;
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
c[i][j]=0;
for(k=0;k<3;k++)
{
c[i][j]= c[i][j] + a[i][k] * b[k][j];
}
}
}
line((c[0][0]+x),(y-c[1][0]),(x+c[0][1]),(y-c[1][1]));
line((x+c[0][0]),(y-c[1][0]),(x+c[0][2]),(y-c[1][2]));
line((x+c[0][1]),(y-c[1][1]),(x+c[0][2]),(y-c[1][2]));
break;
case 2:
printf("\n reflection about y-axis");
a[0][0]=-1;
a[0][1]=0;
a[0][2]=0;
a[1][0]=0;
a[1][1]=1;
a[1][2]=0;
a[2][0]=0;
a[2][1]=0;
a[2][2]=1;
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
c[i][j]=0;
for(k=0;k<3;k++)
{
c[i][j]=c[i][j]+a[i][k]*b[k][j];
}
}
}
line((c[0][0]+x),(y-c[1][0]),(x+c[0][1]),(y-c[1][1]));
line((x+c[0][0]),(y-c[1][0]),(x+c[0][2]),(y-c[1][2]));
line((x+c[0][1]),(y-c[1][1]),(x+c[0][2]),(y-c[1][2]));
break;
case 3:
printf("\n reflection about y=x");
a[0][0]=0;
a[0][1]=1;
a[0][2]=0;
```

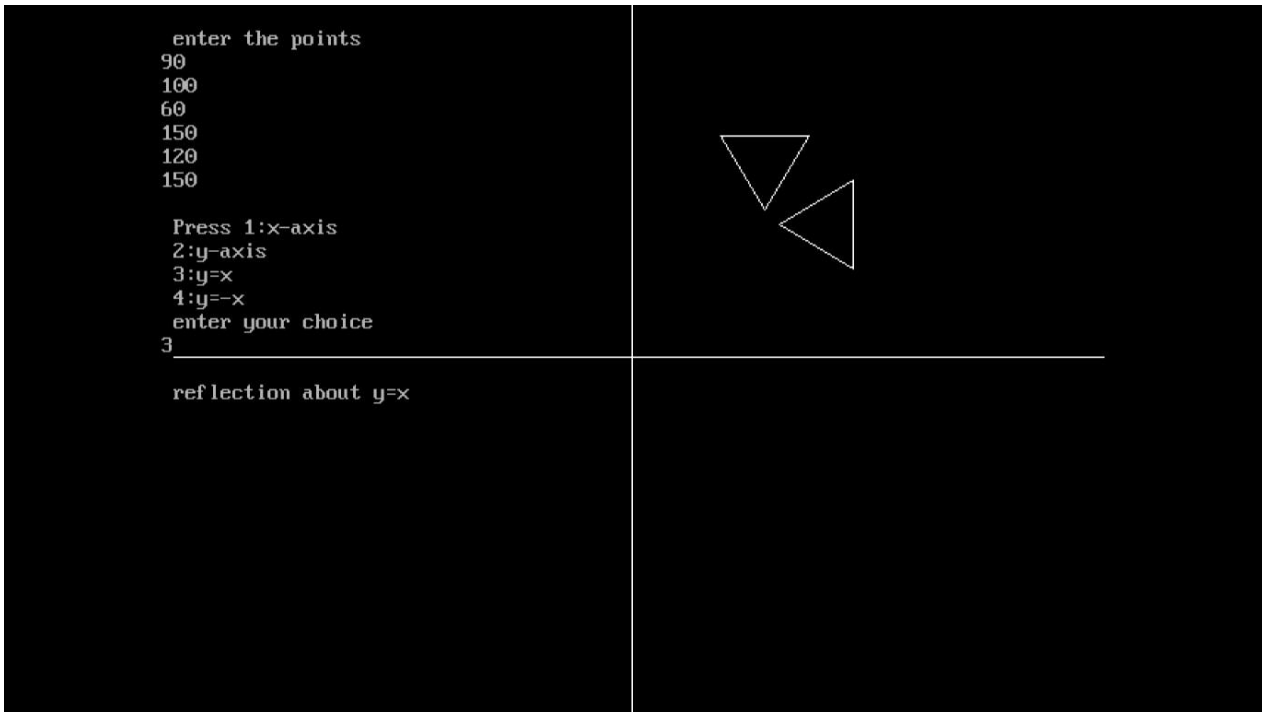
```
a[1][0]=1;
a[1][1]=0;
a[1][2]=0;
a[2][0]=0;
a[2][1]=0;
a[2][2]=1;
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
c[i][j]=0;
for(k=0;k<3;k++)
{
c[i][j]=c[i][j]+a[i][k]*b[k][j];
}
}
}
line((c[0][0]+x),(y-c[1][0]),(x+c[0][1]),(y-c[1][1]));
line((x+c[0][0]),(y-c[1][0]),(x+c[0][2]),(y-c[1][2]));
line((x+c[0][1]),(y-c[1][1]),(x+c[0][2]),(y-c[1][2]));
break;
case 4:
printf("\n reflection about y=-x");
a[0][0]=0;
a[0][1]=-1;
a[0][2]=0;
a[1][0]=-1;
a[1][1]=0;
a[1][2]=0;
a[2][0]=0;
a[2][1]=0;
a[2][2]=1;
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
c[i][j]=0;
for(k=0;k<3;k++)
{
c[i][j]=c[i][j]+a[i][k]*b[k][j];
}
}
}
line((c[0][0]+x),(y-c[1][0]),(x+c[0][1]),(y-c[1][1]));
line((x+c[0][0]),(y-c[1][0]),(x+c[0][2]),(y-c[1][2]));
line((x+c[0][1]),(y-c[1][1]),(x+c[0][2]),(y-c[1][2]));
break;
```

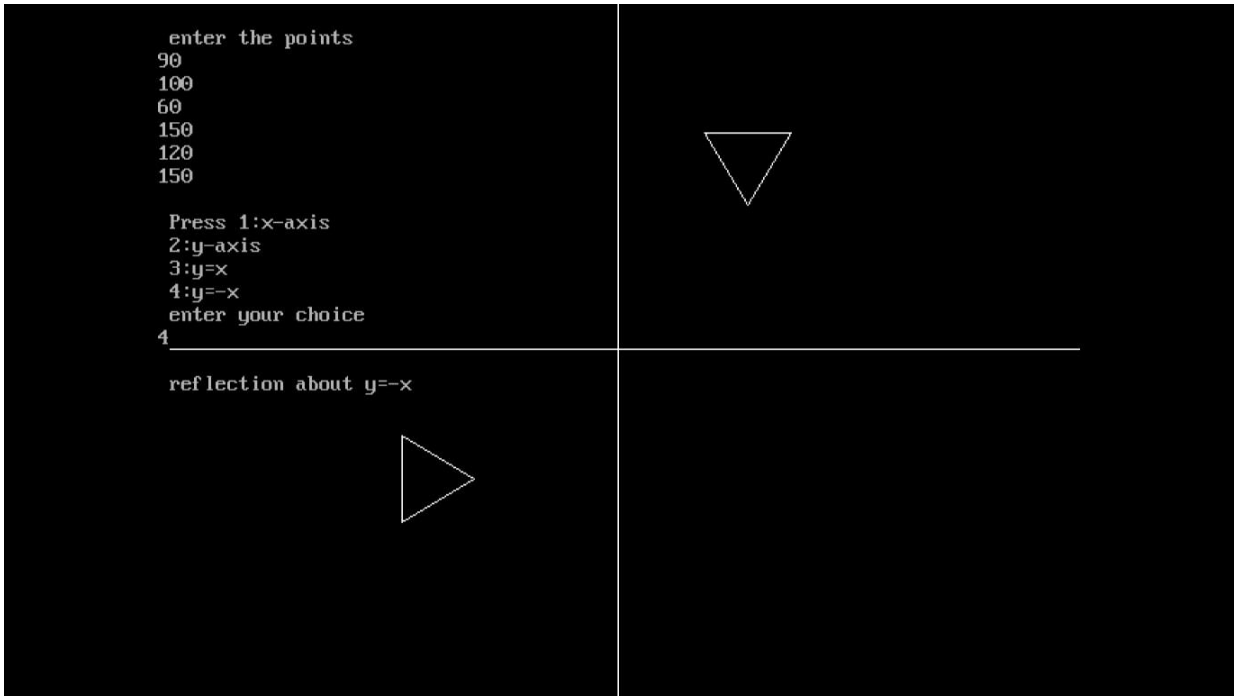
```
default:
printf("\n wrong choice");
}
getch();
return(0);
}
```

Output


enter the points
90
100
60
150
120
150
Press 1:x-axis
2:y-axis
3:y=x
4:y=-x
enter your choice
1
reflection about x-axis


enter the points
90
100
60
150
120
150
Press 1:x-axis
2:y-axis
3:y=x
4:y=-x
enter your choice
2
reflection about y-axis


enter the points
90
100
60
150
120
150
Press 1:x-axis
2:y-axis
3:y=x
4:y=-x
enter your choice
3
reflection about y=x


enter the points
90
100
60
150
120
150
Press 1:x-axis
2:y-axis
3:y=x
4:y=-x
enter your choice
4
reflection about y=-x

Write a program to draw an ellipse using midpoint ellipse generation algorithm.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
int main(void)
{
int gdriver=DETECT,gmode;
float a,b,x,y,p,q,xc,yc;
initgraph(&gdriver,&gmode," ");
printf("\n enter the center points for ellipse");
scanf("%f%f",&xc,&yc);
printf("\n enter the half of major and minor axis");
scanf("%f%f",&a,&b);
x=0;
y=b;
p=(b*b)+(a*a)/4-a*a*b;
while((2*b*b*x)<(2*a*a*y))
{
if(p<0)
{
x=x+1;
y=y;
p=p+(2*b*b*x)+b*b;
}
else
{
x=x+1;
y=y-1;
p=p+(2*b*b*x)-(2*a*a*y)+b*b;
}
putpixel(xc+x,yc+y,WHITE);
putpixel(xc-x,yc+y,WHITE);
putpixel(xc+x,yc-y,WHITE);
putpixel(xc-x,yc-y,WHITE);
}


q=(b*b)*(x+0.5)*(x+0.5)+((a*a)*(y-1)*(y-1))-(a*a)*(b*b);
while(y>=0)
{
if(q<0)
{
x=x+1;
y=y-1;
q=q+(2*b*b*x)-(2*a*a*y)+a*a;
```

```
}
else
{
x=x;
y=y-1;
q=q+(a*a)-(2*a*a*y);
}
putpixel(xc-x,yc-y,WHITE);
putpixel(xc+x,yc-y,WHITE);
putpixel(xc+x,yc+y,WHITE);
putpixel(xc-x,yc+y,WHITE);
}
getch();
return(0);
}
```

Output:

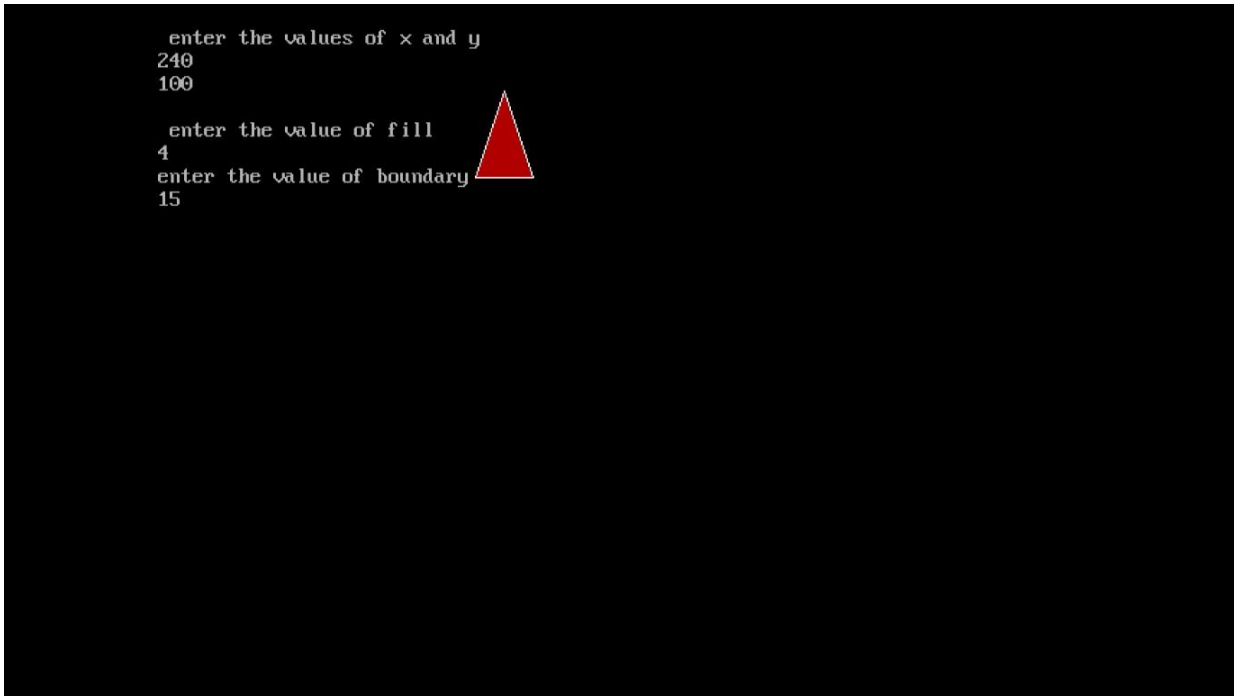
```
 enter the center points for ellipse
100
100

 enter the half of major and minor axis
40
20
```

Write a program to implement boundary fill algorithm to fill a triangle.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
void boundary_fill(int,int,int,int);
void main()
{
int gdriver=DETECT,gmode;
int x,y,fill,boundary;
initgraph(&gdriver,&gmode,"");
printf("\n enter the values of x and y");
scanf("%d%d",&x,&y);
printf("\n enter the value of fill ");
scanf("%d",&fill);
printf("enter the value of boundary");
scanf("%d",&boundary);
line(240,60,220,120);
line(220,120,260,120);
line(240,60,260,120);
boundary_fill(x,y,fill,boundary);
getch();
}
void boundary_fill(int x,int y,int fill,int boundary)
{
int current=getpixel(x,y);
if((current!=boundary)&&(current!=fill))
{
putpixel(x,y,fill);
boundary_fill(x+1,y,fill,boundary);
boundary_fill(x-1,y,fill,boundary);
boundary_fill(x,y+1,fill,boundary);
boundary_fill(x,y-1,fill,boundary);
}
}
```

Output:


enter the values of x and y
240
100
enter the value of fill
4
enter the value of boundary
15

Write a program to implement flood fill algorithm to fill a circle.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
void flood_fill(int,int,int,int);
void main()
{
int gdriver=DETECT,gmode;
int x,y,newcolor,oldcolor;
initgraph(&gdriver,&gmode,"");
printf("\n enter the values of x and y");
scanf("%d%d",&x,&y);
printf("\n enter the value of new color ");
scanf("%d",&newcolor);
printf("enter the value of old color");
scanf("%d",&oldcolor);
circle(200,200,30);
flood_fill(x,y,newcolor,oldcolor);
getch();
}
void flood_fill(int x,int y,int newcolor,int oldcolor)
{
int current=getpixel(x,y);
if(current==oldcolor)
{
putpixel(x,y,newcolor);
flood_fill(x+1,y,newcolor,oldcolor);
flood_fill(x-1,y,newcolor,oldcolor);
flood_fill(x,y+1,newcolor,oldcolor);
flood_fill(x,y-1,newcolor,oldcolor);
}
}
```

Output:


enter the values of x and y
200
200
enter the value of new color
6
enter the value of old color
0

Write a program to implement Liang-Barsky line clipping algorithm.

```
#include<stdlib.h>
#include<conio.h>
#include<dos.h>
#include<graphics.h>
void main()
{
int gdriver=DETECT,gmode;
int x1,x2,y1,y2;
int wxmin,wymin,wxmax,wymax;
float u1=0.0,u2=1.0;
int p1,q1,p2,q2,p3,q3,p4,q4;
float r1,r2,r3,r4;
int x11,y11,x22,y22;
clrscr();
initgraph(&gdriver,&gmode,"");
printf("\n enter the windows left xmin , top boundary ymin");
scanf("%d%d",&wxmin,&wymin);
printf("\n enter the windows right xmax , bottom boundary ymax");
scanf("%d%d",&wxmax,&wymax);
printf("\n enter line: x1,y1 coordinates:\n");
scanf("%d%d",&x1,&y1);
printf("\n enter line: x2,y2 coordinates:\n");
scanf("%d%d",&x2,&y2);
printf("\n liang barsky express these 4 inequalities using lpk=qr");
p1=-(x2-x1);
q1=x1-wxmin;
p2=(x2-x1);
q2=wxmax-x1;
p3=-(y2-y1);
q3=y1-wymin;
p4=(y2-y1);
q4=wymax-y1;
printf("\n p1=0 line is parallel to left clipping \n");
printf("\n p2=0 line is parallel to right clipping \n");
printf("\n p3=0 line is parallel to bottom clipping \n");
printf("\n p4=0 line is parallel to top clipping \n");
if(((p1==0.0) && (q1<0.0)) || ((p2==0.0) && (q2<0.0)) || ((p3==0.0)&&(q3<0.0)) ||
((p4==0.0)&&(q4<0.0)))
{
printf("\n line is rejected:");
getch();
detectgraph(&gdriver,&gmode);
initgraph(&gdriver,&gmode," ");
setcolor(RED);
rectangle(wxmin,wymax,wxmax,wymin);
```

```
setcolor(BLUE);
line(x1,y1,x2,y2);
getch();
setcolor(WHITE);
line(x1,y1,x2,y2);
getch();
}
else
{
if(p1!=0.0)
{
r1=(float)q1/p1;
if(p1<0)
u1=max(r1,u1);
else
u2=min(r1,u2);
}
if(p2!=0.0)
{
r2=(float)q2/p2;
if(p2<0)
u1=max(r2,u1);
else
u2=min(r2,u2);
}
if(p3!=0.0)
{
r3=(float)q3/p3;
if(p3<0)
u1=max(r3,u1);
else
u2=min(r3,u2);
}
if(p4!=0.0)
{
r4=(float)q4/p4;
if(p4<0)
u1=max(r4,u1);
else
u2=min(r4,u2);
}
if(u1>u2)
printf("\n line rejected:");
else
{
x11=x1+u1*(x2-x1);
y11=y1+u1*(y2-y1);
```

```
x22=x1+u2*(x2-x1);
y22=y1+u2*(y2-y1);
printf("\n original line coordinates\n");
printf("\n x1=%d y1=%d x2=%d y2=%d\n",x1,y1,x2,y2);
printf("\n windows coordinates are:\n");
printf("\n wxmin=%d,wymin=%d,wxmax=%d,wymax=%d",wxmin,wymin,wxmax,wymax);
printf("\n new coordinates are ;\n");
printf("\n x1=%d,y1=%d,x2=%d,y2=%d\n",x11,y11,x22,y22);
detectgraph(&gdriver,&gmode);
initgraph(&gdriver,&gmode,"");
setcolor(2);
rectangle(wxmin,wymax,wxmax,wymin);
setcolor(1);
line(x1,y1,x2,y2);
getch();
setcolor(0);
line(x1,y1,x2,y2);
setcolor(3);
line(x11,y11,x22,y22);
getch();
}
}
}
```

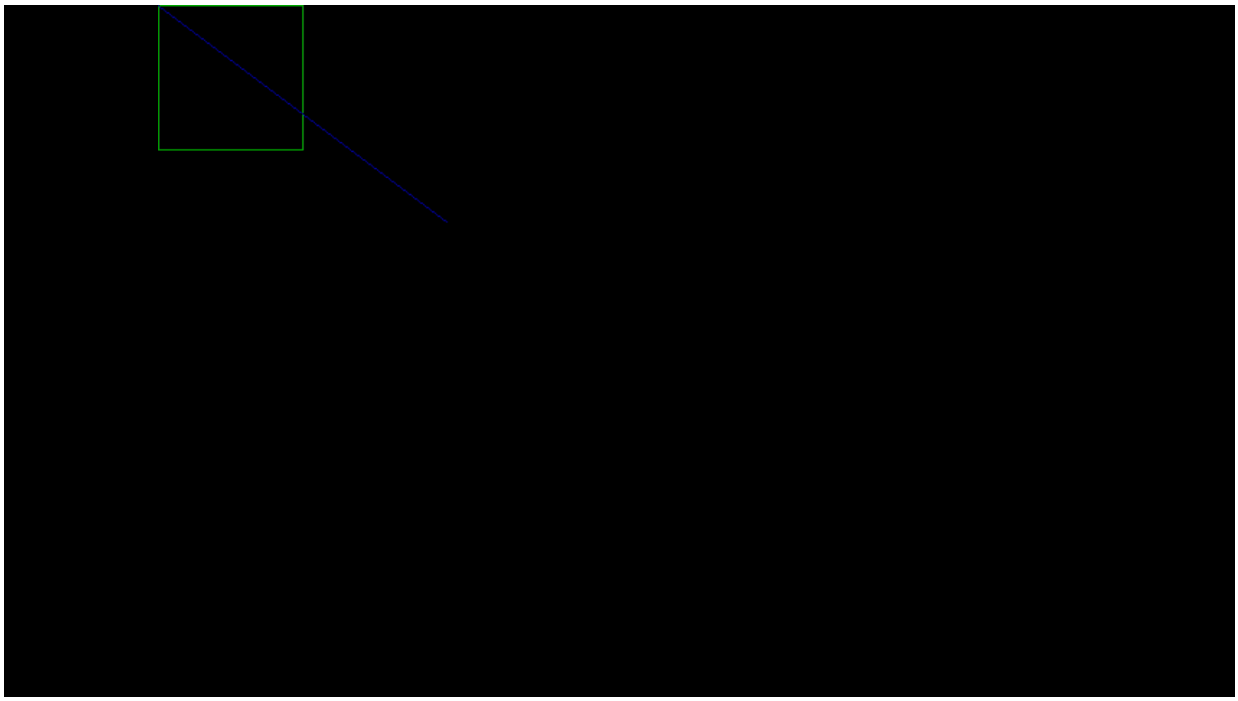
Output:

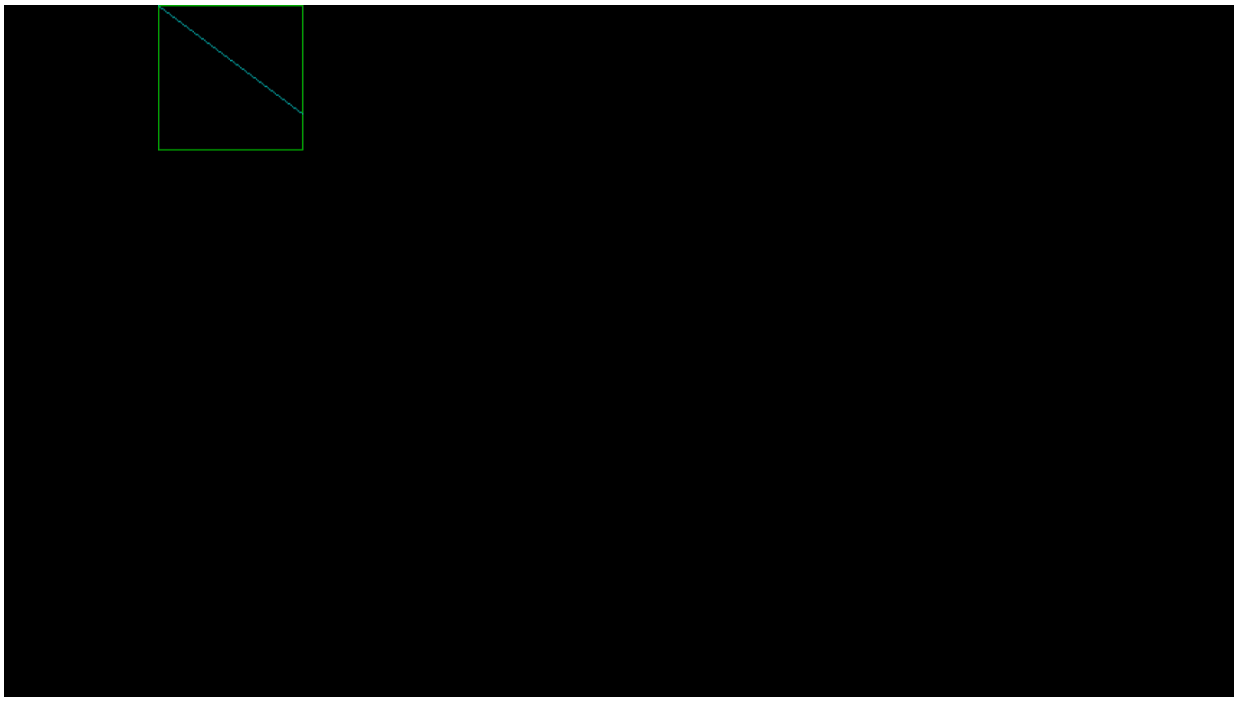
```
 enter the windows left xmin , top boundary ymin
0
0

 enter the windows right xmax , bottom boundary ymax
100
100

 enter line: x1,y1 coordinates:
0
0

 enter line: x2,y2 coordinates:
200
150
```





Write a program to implement oblique projection.

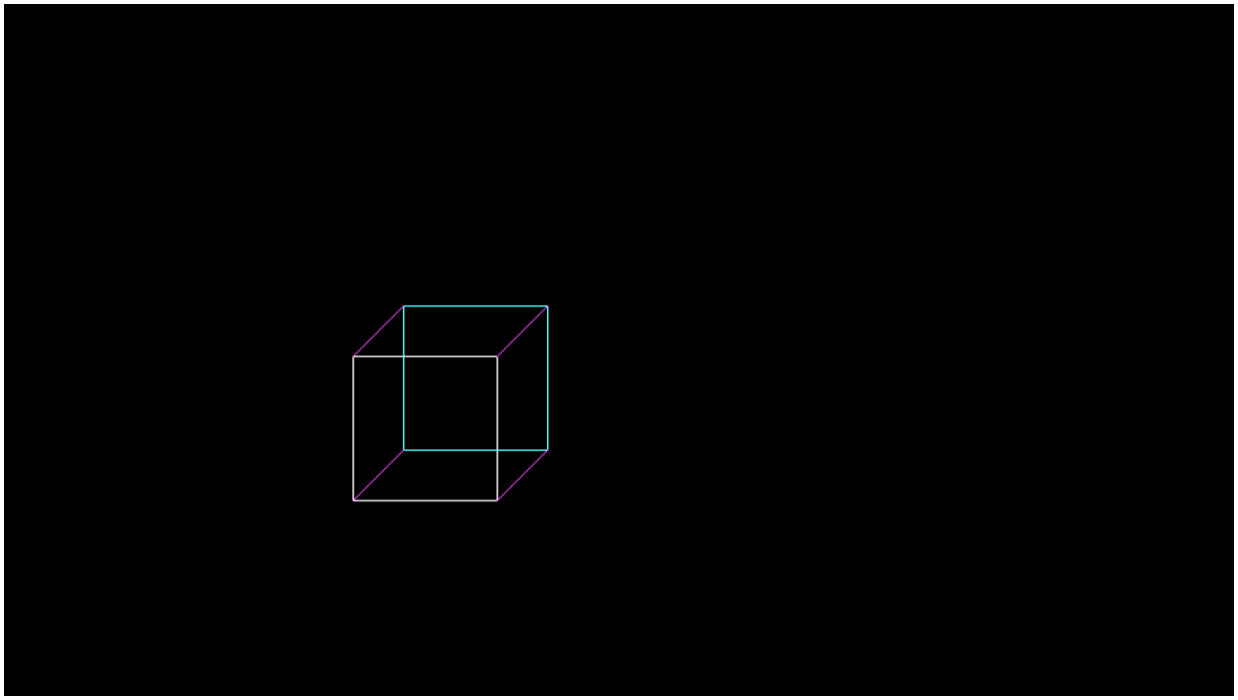
```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
void main()
{
int x1,y1,x2,y2;
int gdriver=DETECT,gmode;
int ymax,a[4][8];
float par[4][4],b[4][8];
int i,j,k,m,n,p;
double L1,phi;

a[0][0]=100;
a[1][0]=100;
a[2][0]=100;
a[0][1]=200;
a[1][1]=100;
a[2][1]=100;
a[0][2]=200;
a[1][2]=200;
a[2][2]=100;
a[0][3]=100;
a[1][3]=200;
a[2][3]=100;
a[0][4]=100;
a[1][4]=100;
a[2][4]=200;
a[0][5]=200;
a[1][5]=100;
a[2][5]=200;
a[0][6]=200;
a[1][6]=200;
a[2][6]=200;
a[0][7]=100;
a[1][7]=200;
a[2][7]=200;
phi=(double)(3.14*45.0)/180;
L1=0.5;
par[0][0]=1;
par[0][1]=0;
par[0][2]=L1*cos(phi);
par[0][3]=0;
par[1][0]=0;
par[1][1]=1;
```

```
par[1][2]=L1*sin(phi);
par[1][3]=0;
par[2][0]=0;
par[2][1]=0;
par[2][2]=0;
par[2][3]=0;
par[3][0]=0;
par[3][1]=0;
par[3][2]=0;
par[3][3]=1;
m=4;
n=4;
p=8;
for(i=0;i<n;i++)
for(k=0;k<p;k++)
b[i][k]=0;
for(i=0;i<m;i++)
for(k=0;k<p;k++)
for(j=0;j<n;j++)
b[i][k]+=(float)par[i][j]*a[j][k];
detectgraph(&gdriver,&gmode);
initgraph(&gdriver,&gmode,"c:\\tc\\bgi");
ymax=getmaxy();
/*- front plane display -*/
for(j=0;j<3;j++)
{
x1=(int) b[0][j];
y1=(int) b[1][j];
x2=(int) b[0][j+1];
y2=(int) b[1][j+1];
line(x1,ymax-y1,x2,ymax-y2);
}
x1=(int) b[0][3];
y1=(int) b[1][3];
x2=(int) b[0][0];
y2=(int) b[1][0];
line(x1,ymax-y1,x2,ymax-y2);
/*- back plane display -*/
setcolor(11);
for(j=4;j<7;j++)
{
x1=(int) b[0][j];
y1=(int) b[1][j];
x2=(int) b[0][j+1];
y2=(int) b[1][j+1];
line(x1,ymax-y1,x2,ymax-y2);
}
```

```
x1=(int) b[0][7];
y1=(int) b[1][7];
x2=(int) b[0][4];
y2=(int) b[1][4];
line(x1,ymax-y1,x2,ymax-y2);
setcolor(13);
for(i=0;i<4;i++)
{
x1=(int) b[0][i];
y1=(int) b[1][i];
x2=(int) b[0][4+i];
y2=(int) b[1][4+i];
line(x1,ymax-y1,x2,ymax-y2);
}
getch();
}
```

Output:



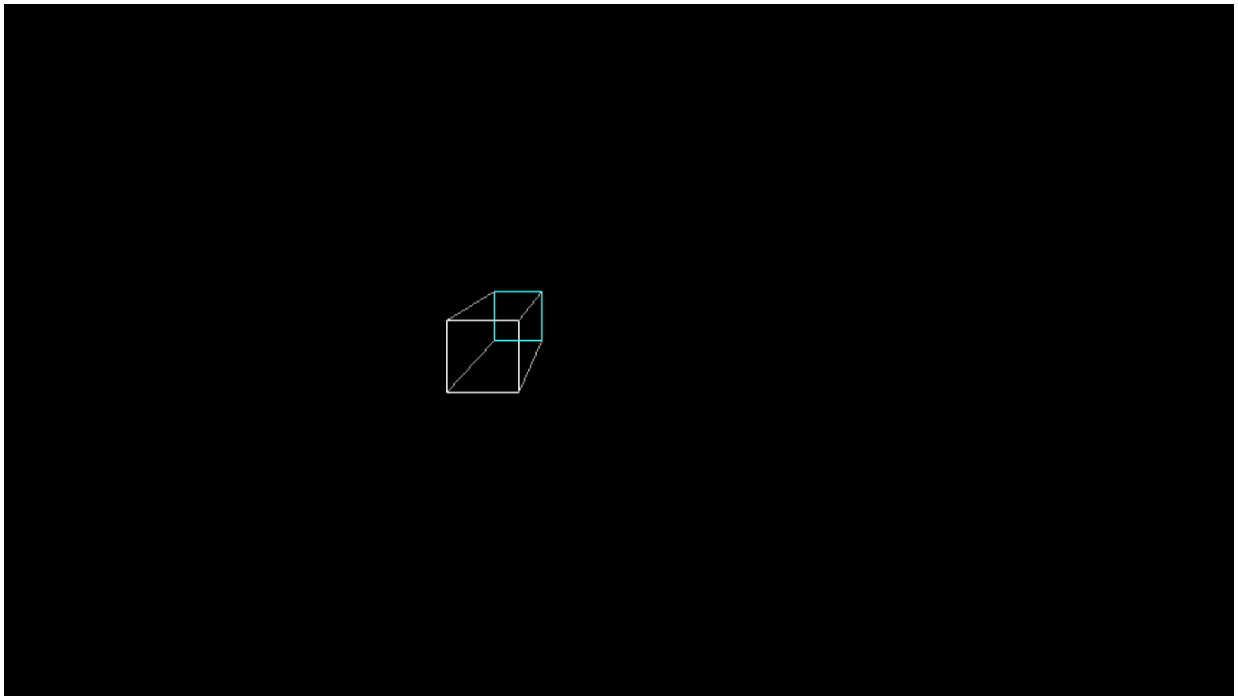
Write a program to implement perspective projection.

```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>
void main()
{
int x1,y1,x2,y2;
int gdriver=DETECT,gmode;
int ymax,a[4][8];
float par[4][4],b[4][8];
int i,j,k,m,n,p;
int xp,yp,zp,x,y,z;

a[0][0]=100;
a[1][0]=100;
a[2][0]=-100;
a[0][1]=200;
a[1][1]=100;
a[2][1]=-100;
a[0][2]=200;
a[1][2]=200;
a[2][2]=-100;
a[0][3]=100;
a[1][3]=200;
a[2][3]=-100;
a[0][4]=100;
a[1][4]=100;
a[2][4]=-200;
a[0][5]=200;
a[1][5]=100;
a[2][5]=-200;
a[0][6]=200;
a[1][6]=200;
a[2][6]=-200;
a[0][7]=100;
a[1][7]=200;
a[2][7]=-200;
detectgraph(&gdriver,&gmode);
initgraph(&gdriver,&gmode,"c:\\tc\\bgi");
ymax=getmaxy();
xp=300;
yp=320;
zp=100;
for(j=0;j<8;j++)
{
x=a[0][j];
```

```
y=a[1][j];
z=a[2][j];
b[0][j]=xp-((float)(x-xp)/(z-zp))*(zp);
b[1][j]=yp-((float)(y-yp)/(z-zp))*(zp);
}
/* front plane display*/
for(j=0;j<3;j++)
{
x1=(int)b[0][j];
y1=(int)b[1][j];
x2=(int)b[0][j+1];
y2=(int)b[1][j+1];
line(x1,ymax-y1,x2,ymax-y2);
}
x1=(int)b[0][3];
y1=(int)b[1][3];
x2=(int)b[0][0];
y2=(int)b[1][0];
line(x1,ymax-y1,x2,ymax-y2);
/* back plane display */
setcolor(11);
for(j=4;j<7;j++)
{
x1=(int)b[0][j];
y1=(int)b[1][j];
x2=(int)b[0][j+1];
y2=(int)b[1][j+1];
line(x1,ymax-y1,x2,ymax-y2);
}
x1=(int)b[0][7];
y1=(int)b[1][7];
x2=(int)b[0][4];
y2=(int)b[1][4];
line(x1,ymax-y1,x2,ymax-y2);
setcolor(7);
for(i=0;i<4;i++)
{
x1=(int)b[0][i];
y1=(int)b[1][i];
x2=(int)b[0][4+i];
y2=(int)b[1][4+i];
line(x1,ymax-y1,x2,ymax-y2);
}
getch();
getch();
}
```

Output:



Write a program to draw the Bezier curve .

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

int x,y,z;

void main()
{
float u;
int gd,gm,ymax,i,n,c[4][3];


for(i=0;i<4;i++) { c[i][0]=0; c[i][1]=0; }



printf("\n\n Enter four points : \n\n");

for(i=0; i<4; i++)
{
printf("\t X%d Y%d : ",i,i);
scanf("%d %d",&c[i][0],&c[i][1]);

}

c[4][0]=c[0][0];
c[4][1]=c[0][1];

detectgraph(&gd,&gm);
initgraph(&gd,&gm,"e:\\tc\\bgi");

ymax = 480;

setcolor(13);
for(i=0;i<3;i++)
{
line(c[i][0],ymax-c[i][1],c[i+1][0],ymax-c[i+1][1]);
}

setcolor(3);
n=3;

for(i=0;i<=40;i++)
{
u=(float)i/40.0;
bezier(u,n,c);

if(i==0)
```

```
{ moveto(x,ymax-y);}
else
{ lineto(x,ymax-y); }
getch();
}
getch();
}
bezier(u,n,p)
float u;int n; int p[4][3];
{
int j;
float v,b;
float blend(int,int,float);
x=0;y=0;z=0;
for(j=0;j<=n;j++)
{
b=blend(j,n,u);
x=x+(p[j][0]*b);
y=y+(p[j][1]*b);
z=z+(p[j][2]*b);
}
}

float blend(int j,int n,float u)
{
int k;
float v,blend;
v=C(n,j);
for(k=0;k<j;k++)
{ v*=u; }
for(k=1;k<=(n-j);k++)
{ v *= (1-u); }
blend=v;
return(blend);
}

C(int n,int j)
{
int k,a,c;
a=1;
for(k=j+1;k<=n;k++) { a*=k; }
for(k=1;k<=(n-j);k++) { a=a/k; }
c=a;
return(c);
}
```