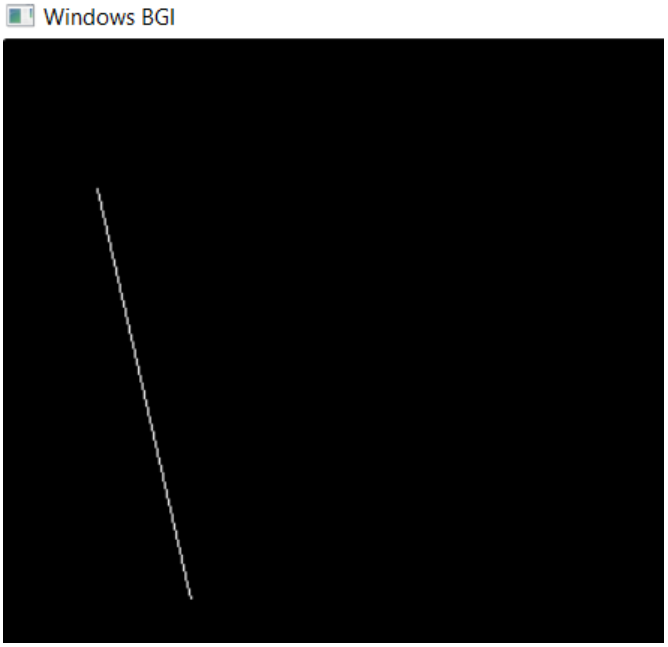
1. Basic Primitives:

1.1 Line:

Source Code:

```
#include <graphics.h>
#include <conio.h>
Int main()
{
        int gd = DETECT, gm;
        initgraph(&gd, &gm, "C:/TURBOC3/BGI");
        line(50,80,100,300);
        getch();
        closegraph();
        return 0;
}
```

Output:

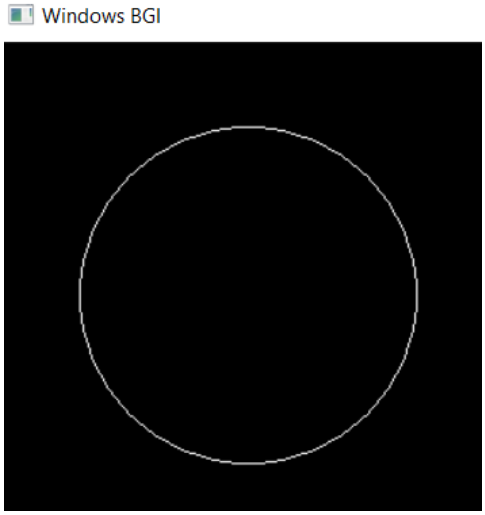


1.2 Circle:

Source Code:

```
//C Implementation for Drawing Circle

        #include <graphics.h>

int main()
{
        int gd = DETECT, gm;

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

        circle(150, 150, 100);

        getch();

        closegraph();

        return 0;
}
```

Output:



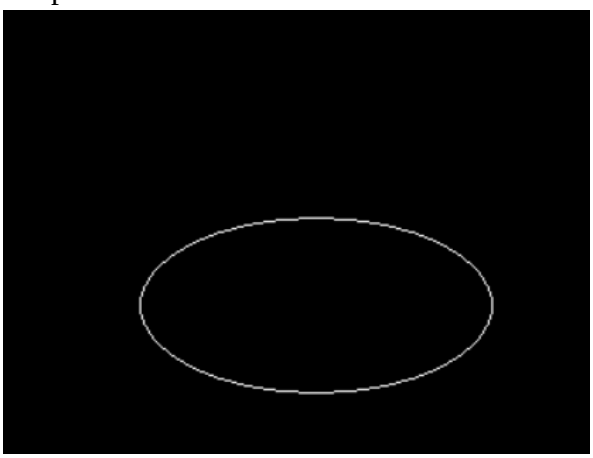
1.3 Ellipse

Source Code:

```
// C Implementation for drawing ellipse
#include <graphics.h>
int main()
{
```

```
        int gd = DETECT, gm;
        int x = 250, y = 200;
        int start_angle = 0;
        int end_angle = 360;
        int x_rad = 100;
        int y_rad = 50;
        initgraph(&gd, &gm, "");
        ellipse(x, y, start_angle,
        end_angle, x_rad, y_rad);

        getch();
        closegraph();

        return 0;
}
```

Output:



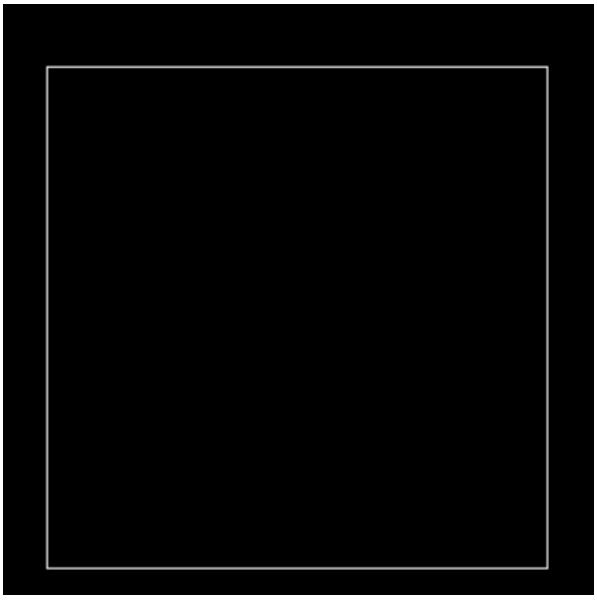
1.4 Rectangle

Source Code:

```
// C program to draw a rectangle
#include <graphics.h>
int main()
{
        int gd = DETECT, gm;

        // location of left, top, right, bottom
        int left = 150, top = 150;
        int right = 450, bottom = 450;

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

```
        // rectangle function
        rectangle(left, top, right, bottom);
        getch();
        closegraph();
        return 0;
}
```

Output:



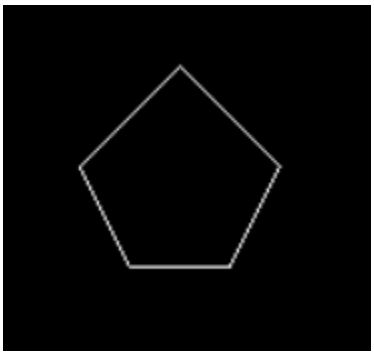
1.5 Polygon

Source Code:

```
// C program to draw a Polygon
#include <graphics.h>
#include <conio.h>

int main()
{
  int gd = DETECT, gm;
  initgraph(&gd, &gm, "C:/TURBOC3/BGI");

        int pentagon[12] = {340,150,320,110,360,70,400,110,380,150,340,150};
        drawpoly(6,pentagon);
```

```
   getch();
}
```

Output:



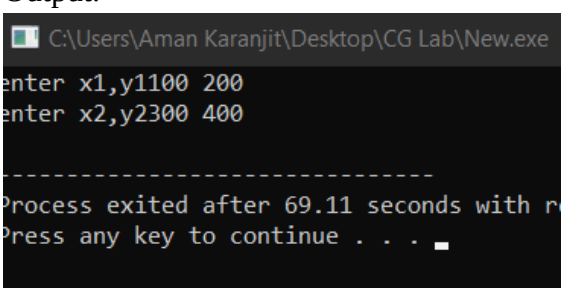
2. Digital Differential Analyzer (DDA):

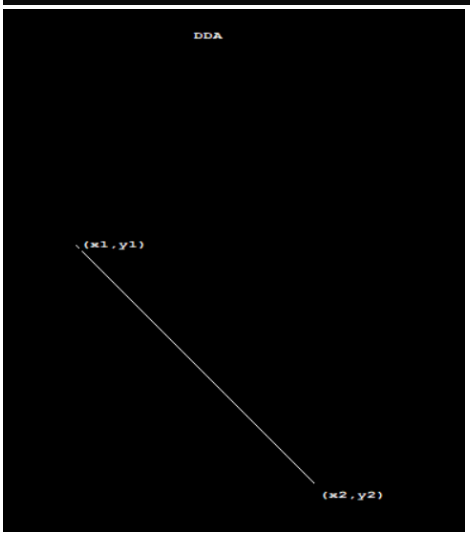
Source Code:

```
#include<stdio.h>
#include<graphics.h>
#include<math.h>
float round(float a);
int main()
{
int gd=DETECT,gm;
// gd=graphics driver (detects best graphics driver and assigns it as default, gm=graphics
mode.
int x1,y1,x2,y2,steps,k;
float xincr,yincr,x,y,dx,dy;
printf("enter x1,y1");
scanf("%d%d",&x1,&y1);
printf("enter x2,y2");
scanf("%d%d",&x2,&y2);
initgraph(&gd,&gm,"c:\\turboc3\\BGI");//initializes the graph
dx=x2-x1;
dy=y2-y1;
if(abs(dx)>abs(dy))
steps=abs(dx);
else
steps=abs(dy);
xincr=dx/steps;
yincr=dy/steps;
x=x1;
y=y1;
```

```
for(k=1;k<=steps;k++)
{
delay(100);//for seeing the line drawing process slowly.
x+=xincr;
y+=yincr;
putpixel(round(x),round(y),WHITE);
}
outtextxy(200,20,"DDA"); // for printing text at desired screen location.
outtextxy(x1+5,y1-5,"(x1,y1)");
outtextxy(x2+5,y2+5,"(x2,y2)");
getch();
}
float round(float a)
{
int b=a+0.5;
return b;
}
```

Output:





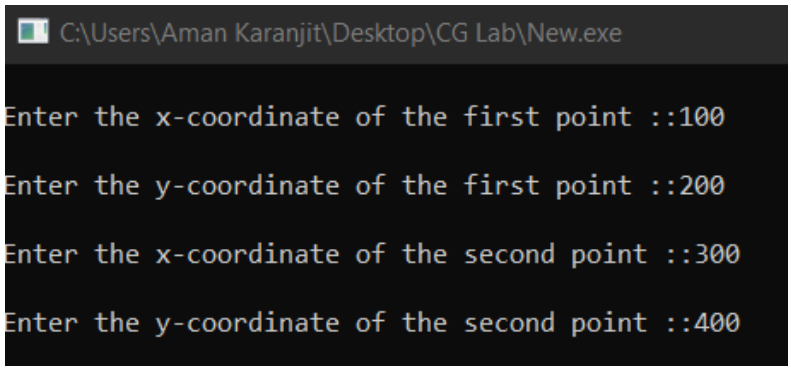
3. Bresenham's Line Drawing Algorithm (BLA):

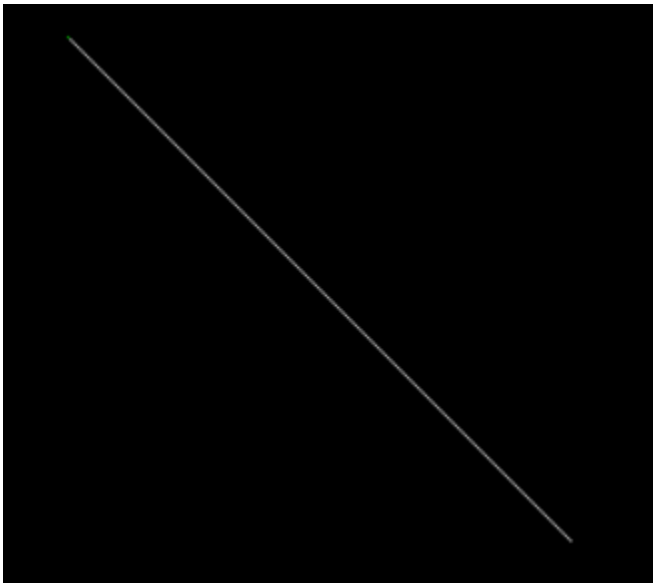
Source Code:

```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>
int main()
{
int x,y,x1,y1,x2,y2,p,dx,dy;
int gd=DETECT,gm;
initgraph(&gd,&gm,"C:\\TurboC3\\BGI");
printf("\nEnter the x-coordinate of the first point ::");
scanf("%d",&x1);
printf("\nEnter the y-coordinate of the first point ::");
scanf("%d",&y1);
printf("\nEnter the x-coordinate of the second point ::");
scanf("%d",&x2);
printf("\nEnter the y-coordinate of the second point ::");
scanf("%d",&y2);
x=x1;
y=y1;
dx=x2-x1;
dy=y2-y1;
putpixel(x,y,2);
p=(2*dy-dx);
while(x<=x2)
{
if(p<0)
 {
x=x+1;
 p=p+2*dy;
 }
 else
{
x=x+1;
y=y+1;
p=p+(2*dy)-(2*dx);
 }
 putpixel(x,y,7);
}
getch();
```

```
closegraph();
}
```

Output:





4. Mid-Point Circle Drawing Algorithm:

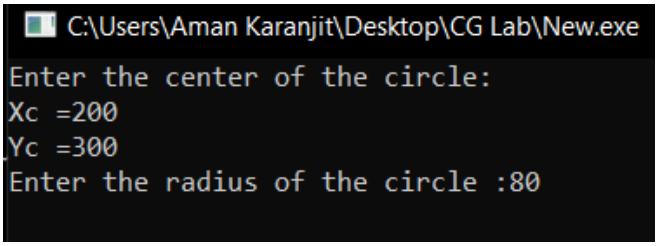
Source Code:

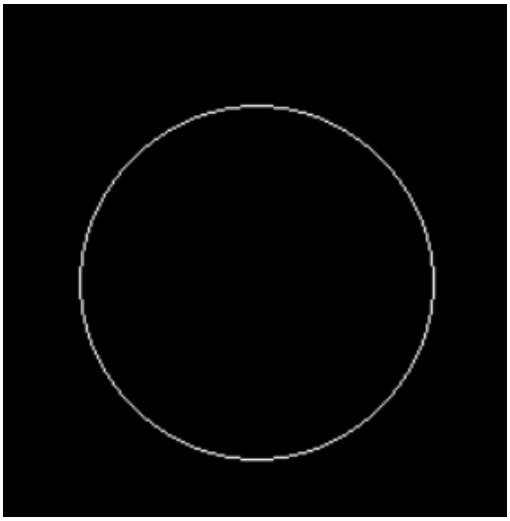
```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>
int draw_circle(int,int,int);
int symmetry(int,int,int,int);
int main()
{
int xc,yc,R;
int gd=DETECT,gm;
initgraph(&gd,&gm,"C:\\TurboC3\\BGI");
printf("Enter the center of the circle:\n");
```

```
printf("Xc =");
scanf("%d",&xc);
printf("Yc =");
scanf("%d",&yc);
printf("Enter the radius of the circle :");
scanf("%d",&R);
draw_circle(xc,yc,R);
getch();
closegraph();
}
int draw_circle(int xc,int yc,int rad)
{
int x = 0;
int y = rad;
int p = 1-rad;
symmetry(x,y,xc,yc);
for(x=0;y>x;x++)
 {
 if(p<0)
 p += 2*x + 3;
 else
 {
 p += 2*(x-y) + 5;
 y--;
 }
 symmetry(x,y,xc,yc);
 delay(20);
 }
}
int symmetry(int x,int y,int xc,int yc)
{
putpixel(xc+x,yc-y,WHITE); //For pixel (x,y)
delay(20);
putpixel(xc+y,yc-x, WHITE); //For pixel (y,x)
delay(20);
putpixel(xc+y,yc+x, WHITE); //For pixel (y,-x)
delay(20);
putpixel(xc+x,yc+y, WHITE); //For pixel (x,-y)
delay(20);
putpixel(xc-x,yc+y, WHITE); //For pixel (-x,-y)
```

```
delay(20);
putpixel(xc-y,yc+x, WHITE); //For pixel (-y,-x)
delay(20);
putpixel(xc-y,yc-x, WHITE); //For pixel (-y,x)
delay(20);
putpixel(xc-x,yc-y, WHITE); //For pixel (-x,y)
delay(20);
}
```

Output:





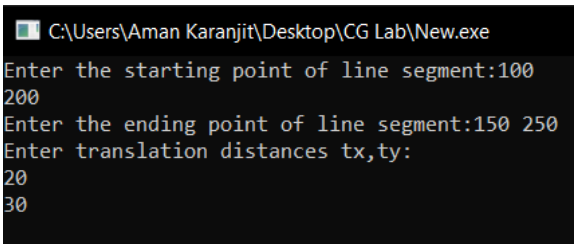
5. Translation:

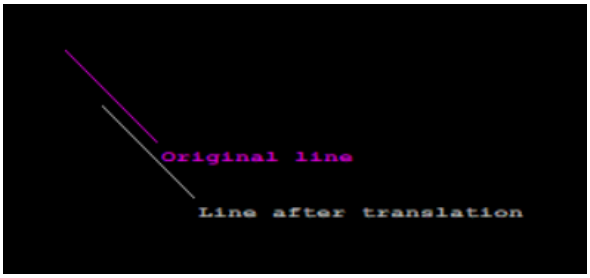
Source Code:

```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>
#include<math.h>
int main()
{
int gd=DETECT,gm;
int x1,y1,x2,y2,tx,ty,x3,y3,x4,y4;
initgraph(&gd,&gm,"C:\\TurboC3\\BGI");
printf("Enter the starting point of line segment:");
scanf("%d %d",&x1,&y1);
```

```
printf("Enter the ending point of line segment:");
scanf("%d %d",&x2,&y2);
printf("Enter translation distances tx,ty:\n");
scanf("%d%d",&tx,&ty);
setcolor(5);
line(x1,y1,x2,y2);
outtextxy(x2+2,y2+2,"Original line");
x3=x1+tx;
y3=y1+ty;
x4=x2+tx;
y4=y2+ty;
setcolor(7);
line(x3,y3,x4,y4);
outtextxy(x4+2,y4+2,"Line after translation");
getch();
}
```

Output:





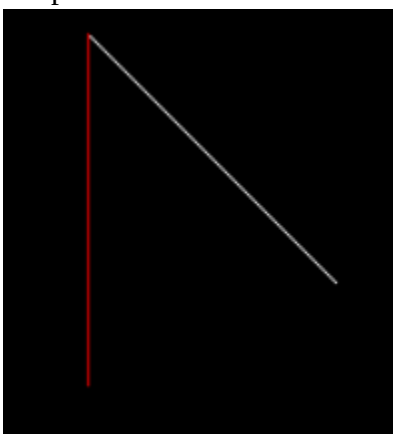
6. Rotation:

Source Code:

```
#include<graphics.h>
#include<stdio.h>
#include<conio.h>
#include<math.h>
int main()
{
int gd=DETECT,gm;
```

```
int pivot_x,pivot_y,x,y;
double degree,radian;
int rotated_point_x,rotated_point_y;
initgraph(&gd,&gm,"C://TURBOC3//BGI");
cleardevice();
printf("\t\t*********** ROTATION *********** \n");
printf("\n Enter an initial coordinates of the line = ");
scanf("%d %d",&pivot_x,&pivot_y);
printf("\n Enter a final coordinates of the line = ");
scanf("%d %d",&x,&y);
line(pivot_x,pivot_y,x,y);
printf("\n\n Now, Enter a degree = ");
scanf("%lf",&degree);
radian=degree*0.01745;
rotated_point_x=(int)(pivot_x +((x-pivot_x)*cos(radian)-(y-pivot_y)*sin(radian)));
rotated_point_y=(int)(pivot_y +((x-pivot_x)*sin(radian)+(y-pivot_y)*cos(radian)));
setcolor(RED);
line(pivot_x,pivot_y,rotated_point_x,rotated_point_y);
getch();
closegraph();
}
```

Output:



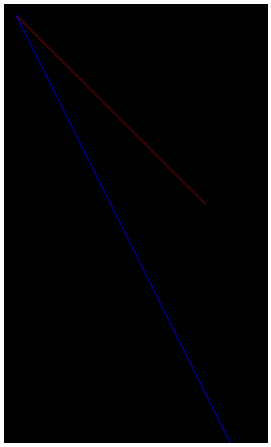
7. Scaling:

Source Code:

```
#include<stdio.h>
#include<graphics.h>
#include<math.h>
int graDriver=DETECT,graMode;
int n,xs[100],ys[100],i;
```

```
float sfx,sfy;

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

void scale()
{
for(i=0;i<n;i++)
 {
 xs[i]=xs[0]+(int)((float)(xs[i]-xs[0])*sfx);
 ys[i]=ys[0]+(int)((float)(ys[i]-ys[0])*sfy);
 }
}
int main()
{
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]);
printf("Enter scale factors: (xs,ys) ");
scanf("%f%f",&sfx,&sfy);
initgraph(&graDriver,&graMode,"C:\\TURBOC3\\BGI\\");
setcolor(RED);
DrawFn();//original
scale();//scaling
setcolor(BLUE);
DrawFn();
getch();
}
```

Output:



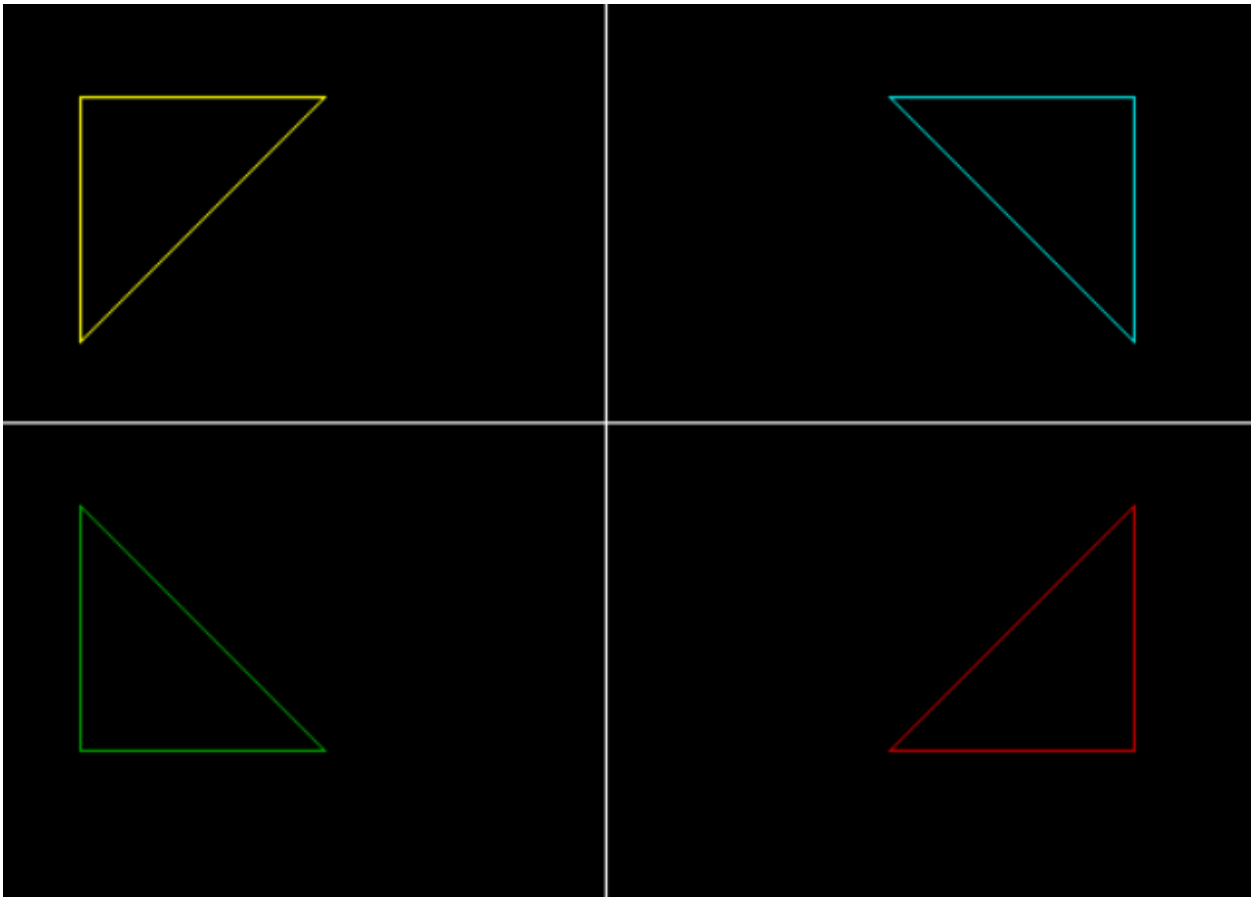
8. Reflection:

Source Code:

```
#include <conio.h>
#include <graphics.h>
#include <stdio.h>
int main()
{
   int gm, gd = DETECT, ax, x1 = 100;
   int x2 = 100, x3 = 200, y1 = 100;
   int y2 = 200, y3 = 100;

   // Add in your BGI folder path
   // like below initgraph(&gd, &gm,
   // "C:\\TURBOC3\\BGI");
   initgraph(&gd, &gm, "");
   cleardevice();
   line(getmaxx() / 2, 0, getmaxx() / 2,
       getmaxy());
   line(0, getmaxy() / 2, getmaxx(),
       getmaxy() / 2);
   printf("Before Reflection Object"
         " in 2nd Quadrant");
   setcolor(14);
   line(x1, y1, x2, y2);
   line(x2, y2, x3, y3);
   line(x3, y3, x1, y1);
   printf("\nAfter Reflection");
   setcolor(4);
```

```
    line(getmaxx() - x1, getmaxy() - y1,
        getmaxx() - x2, getmaxy() - y2);

    line(getmaxx() - x2, getmaxy() - y2,
        getmaxx() - x3, getmaxy() - y3);

    line(getmaxx() - x3, getmaxy() - y3,
        getmaxx() - x1, getmaxy() - y1);

    setcolor(3);
    line(getmaxx() - x1, y1,
        getmaxx() - x2, y2);
    line(getmaxx() - x2, y2,
        getmaxx() - x3, y3);
    line(getmaxx() - x3, y3,
        getmaxx() - x1, y1);
    setcolor(2);
    line(x1, getmaxy() - y1, x2,
        getmaxy() - y2);
    line(x2, getmaxy() - y2, x3,
        getmaxy() - y3);
    line(x3, getmaxy() - y3, x1,
        getmaxy() - y1);
    getch();
    closegraph();
}
```

Output:



9. Rotation about fixed Point

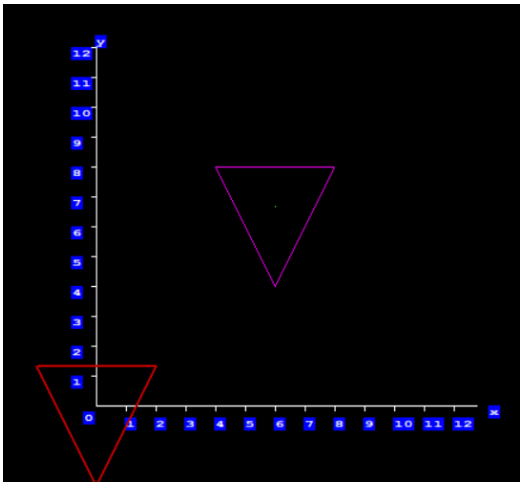
Source Code:

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

int main()
{
   int gd=DETECT,gm,x,y,ch;
```

```
char p[10];
int i,t;
initgraph(&gd,&gm,"c:\\turboc3\\bgi");
setbkcolor(BLUE);
outtextxy(480,400,"x");
outtextxy(150,90,"y");
line(150,100,150,400);
line(150,400,470,400);
outtextxy(140,405,"0");
for(i=0,t=25;i<12;i++)
{
   itoa(i+1,p,10);
   outtextxy(150+t,410,p);
   line(150+t,400,150+t,405);
   itoa(i+1,p,10);
   outtextxy(130,400-t,p);
   line(150,400-t,145,400-t);
   t+=25;
}

setcolor(5);
line(250,200,350,200);
line(250,200,300,300);
line(300,300,350,200);
x=(250+350+300)/3;
y=(200+200+300)/3;
putpixel(x,y,10);
setcolor(RED);
```

```
        setlinestyle(2,0,2);
        line(150,467,200,367);
        line(100,367,150,467);
        line(100,367,200,367);
        getch();
        setbkcolor(RED);
        setcolor(YELLOW);
        line(200,350,150-67,400);
        line(200,350,200,450);
        line(200,450,150-67,400);
        setcolor(YELLOW);
        getch();
        setbkcolor(RED);
        line(300-67,233,350,183);
        line(350,183,350,283);
        line(350,283,300-67,233);
    getch();
}
```

Output:



10. Scaling about fixed point

Source Code:

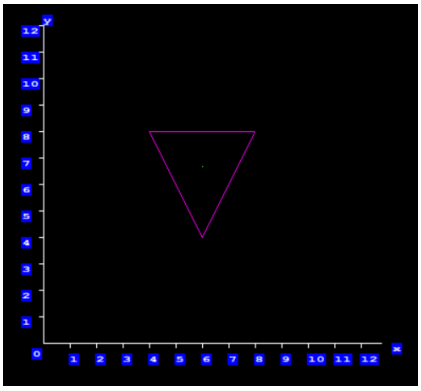
```
//program for fixed point translation & fixed point scaling

#include<stdio.h>
#include<conio.h>
#include<graphics.h>
#include<dos.h>
#include<stdlib.h>

 int main()
{
    int gd=DETECT,gm,x,y,ch;
    char p[10];
    int i,t;



    initgraph(&gd,&gm,"c:\\tc\\bgi");
    setbkcolor(BLUE);
    outtextxy(480,400,"x");
    outtextxy(150,90,"y");
    line(150,100,150,400);
    line(150,400,470,400);
    outtextxy(140,405,"0");
    for(i=0,t=25;i<12;i++)
    {
        itoa(i+1,p,10);
        outtextxy(150+t,410,p);
```

```
    line(150+t,400,150+t,405);
    itoa(i+1,p,10);
    outtextxy(130,400-t,p);
    line(150,400-t,145,400-t);
    t+=25;
}
setcolor(5);
line(250,200,350,200);
line(250,200,300,300);
line(300,300,350,200);
x=(250+350+300)/3;
y=(200+200+300)/3;
putpixel(x,y,10);
printf("Enter your choice");
printf("\npress 1: fixed point Rotation");
printf("\npress 2: fixed point Scaling");
printf("\nchoice=");
scanf("%d",&ch);
switch(ch)
{
case 1: setcolor(RED);
    setlinestyle(2,0,2);
    line(150,467,200,367);
    line(100,367,150,467);
    line(100,367,200,367);
    getch();
    setbkcolor(RED);
    setcolor(YELLOW);
```

```
    line(200,350,150-67,400);
    line(200,350,200,450);
    line(200,450,150-67,400);
    setcolor(YELLOW);
    getch();
    setbkcolor(RED);
    line(300-67,233,350,183);
    line(350,183,350,283);
    line(350,283,300-67,233);
    break;


 case 2: setcolor(RED);
    setlinestyle(2,0,2);
    line(150,467,200,367);
    line(100,367,150,467);
    line(100,367,200,367);
    getch();
    setcolor(YELLOW);
    line(150,447,180,377);
    line(180,377,120,377);
    line(120,377,150,447);
    setbkcolor(RED);
    getch();
    setcolor(YELLOW);
    line(270,210,330,210);
    line(270,210,300,280);
    line(300,280,330,210);
```

```
        getch();
        break;

    default : exit(0);
          break;
    }
    getch();
}
```

Output:



11. Scan Line Polygon Fill Algorithm

Source Code:

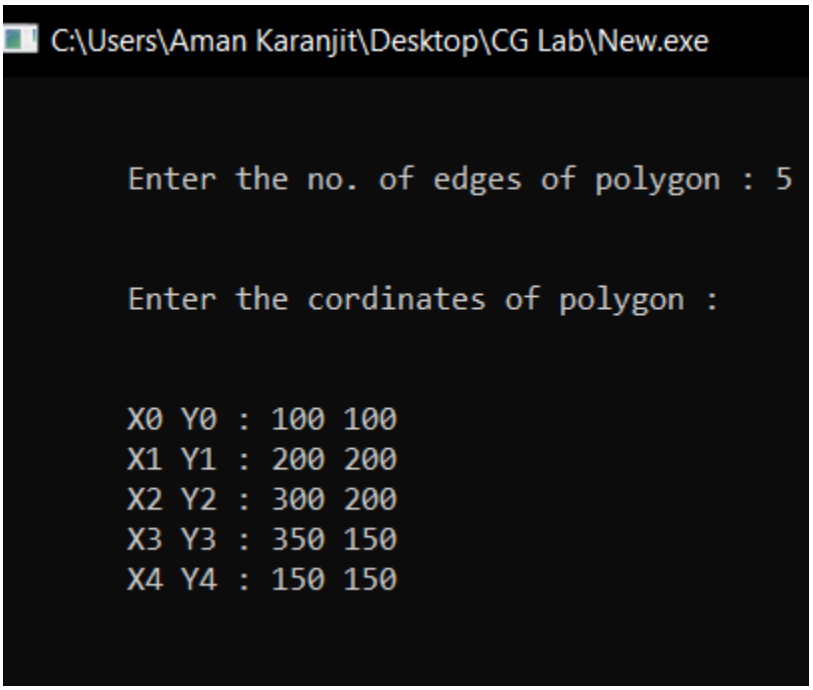
```
#include <stdio.h>
#include <conio.h>
#include <graphics.h>
int main()
{
int n,i,j,k,gd,gm,dy,dx;
int x,y,temp;
int a[20][2],xi[20];
float slope[20];
```

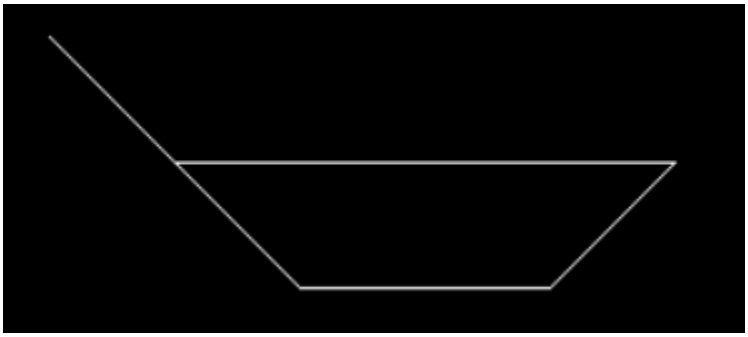
```
printf("\n\n\tEnter the no. of edges of polygon : ");
scanf("%d",&n);
printf("\n\n\tEnter the cordinates of polygon :\n\n\n ");
for(i=0;i<n;i++)
{
printf("\tX%d Y%d : ",i,i);
scanf("%d %d",&a[i][0],&a[i][1]);
}
a[n][0]=a[0][0];
a[n][1]=a[0][1];
detectgraph(&gd,&gm);
initgraph(&gd,&gm,"C:\\TurboC3\\BGI");
/*- draw polygon -*/
for(i=0;i<n;i++)
{
line(a[i][0],a[i][1],a[i+1][0],a[i+1][1]);
}
getch();
for(i=0;i<n;i++)
{
dy=a[i+1][1]-a[i][1];
dx=a[i+1][0]-a[i][0];
if(dy==0) slope[i]=1.0;
if(dx==0) slope[i]=0.0;
if((dy!=0)&&(dx!=0)) /*- calculate inverse slope -*/
{
slope[i]=(float) dx/dy;
```

```
}
}
for(y=0;y< 480;y++)
{
k=0;
for(i=0;i<n;i++)

 {
if( ((a[i][1]<=y)&&(a[i+1][1]>y))||
((a[i][1]>y)&&(a[i+1][1]<=y)))
{
xi[k]=(int)(a[i][0]+slope[i]*(y-a[i][1]));
k++;
}
}
for(j=0;j<k-1;j++) /*- Arrange x-intersections in order -*/
for(i=0;i<k-1;i++)
{
if(xi[i]>xi[i+1])
{
temp=xi[i];
xi[i]=xi[i+1];
xi[i+1]=temp;
}
}
setcolor(3);
for(i=0;i<k;i+=2)
{
```

```
line(xi[i],y,xi[i+1]+1,y);
getch();
}
}
}55
11
```

Output:





12. Shearing:

Source Code:

```
#include<stdio.h>
#include<graphics.h>
#include<math.h>
int graDriver=DETECT,graMode;
int n,xs[100],ys[100],i;
float shearXfactor,shearYfactor;

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

void shearAlongX()
{
for(i=0;i<n;i++)
 xs[i]=xs[i]+shearXfactor*ys[i];
}

void shearAlongY()
{
for(i=0;i<n;i++)
 ys[i]=ys[i]+shearYfactor*xs[i];
}

int main()
```

```
{
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]);
printf("Enter x shear factor:");
scanf("%f",&shearXfactor);
printf("Enter y shear factor:");
scanf("%f",&shearYfactor);

initgraph(&graDriver,&graMode,"C:\\TURBOC3\\BGI\\");
setcolor(RED);
DrawFn();//original
shearAlongX();
setcolor(BLUE);
DrawFn();//Xshear
shearAlongY();
setcolor(GREEN);
DrawFn();//Yshear
getch();

}
```

Output: