Q1. DDA Line Drawing algorithm

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

void main()
 {
  int gd=DETECT,gm ;
  int x1,x2,y1,y2,i,step,dx,dy,xn,yn ;

  initgraph(&gd,&gm,"C:\\TURBOC3\\BGI");
  printf("Enter the 1st point co-ordinates :");
  scanf("%d%d",&x1,&y1);
  printf("Enter the 2nd point co-ordinates :");
  scanf("%d%d",&x2,&y2);
  cleardevice();

  dx=x2-x1;
  dy=y2-y1;

  if(abs(dx)>abs(dy))
   step=abs(dx);
  else
   step=abs(dy);
```

```
  xn=dx/step;
  yn=dy/step;

  for(i=1;i<=step;i++)
  {
    putpixel(x1,y1,WHITE);
    delay(50);
    x1=x1+xn;
    y1=y1+yn;
  }

 getch();
}
```

```
Enter the 1st point co-ordinates :200 200
Enter the 2nd point co-ordinates :350 350
```

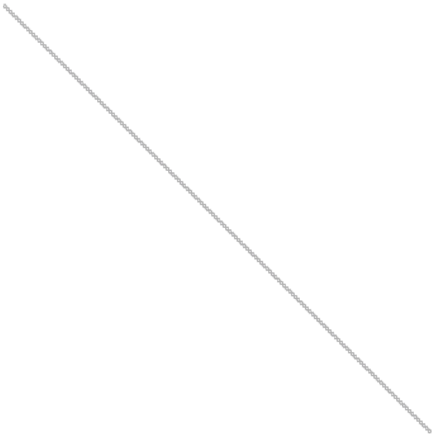
Q2. Bresenham's Line Drawing

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

```
#include<conio.h>

void main() {
   int gd = DETECT, gm;
   int x1, y1, x2, y2, dx, dy, x, y, pk;

   // Initialize graphics mode
   initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");

   // Input the start and end points
   printf("Enter the 1st point coordinates (x1, y1): ");
   scanf("%d%d", &x1, &y1);
   printf("Enter the 2nd point coordinates (x2, y2): ");
   scanf("%d%d", &x2, &y2);

   // Calculate differences
   dx = x2 - x1;
   dy = y2 - y1;

   // Determine the initial decision parameter
   pk = (2 * dy) - dx;

   // Set starting point
   x = x1;
   y = y1;

   // Draw the initial pixel
```

```
    putpixel(x, y, WHITE);

    // Bresenham's Line Algorithm for positive slope
    while (x < x2) {
    x=x+1;
    if (pk >= 0) {
        y=y+1;
        pk += (2 * dy) - (2 * dx);
    } else {
        pk += 2 * dy;
    }
    putpixel(x, y, WHITE);
    delay(10); // Add delay for visualization
    }
    getch();
}
```

```
Enter the 1st point co-ordinates :200 200
Enter the 2nd point co-ordinates :350 350
```

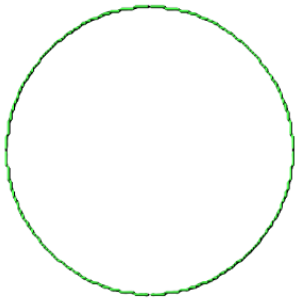


Q3. Bresenham's Circle Drawing Algorithm

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

void main()
 {
  int gd=DETECT,gm ;
  int xc=300,yc=300,x,y,r,d;
  initgraph(&gd,&gm,"C:\\TURBOC3\\BGI");

  printf("Enter radius of circle : ");
  scanf("%d",&r);

  x=0;
  y=r;
  // d is decision parameter
  d=(3-(2*r));

  while(x<=y)
  {
   x=x+1;
   if(d<0)
```

```
    d=d+(4*x)+6;
   else
    {
     d=d+(4*(x-y))+10;
     y=y-1;
    }

   delay(50);

  putpixel(xc+x,yc+y,10);
  putpixel(xc+y,yc+x,10);
  putpixel(xc-y,yc+x,10);
  putpixel(xc-x,yc+y,10);
  putpixel(xc+y,yc-x,10);
  putpixel(xc+x,yc-y,10);
  putpixel(xc-y,yc-x,10);
  putpixel(xc-x,yc-y,10);
 }

getch();

}
```

```
Enter radius of circle : 60
```

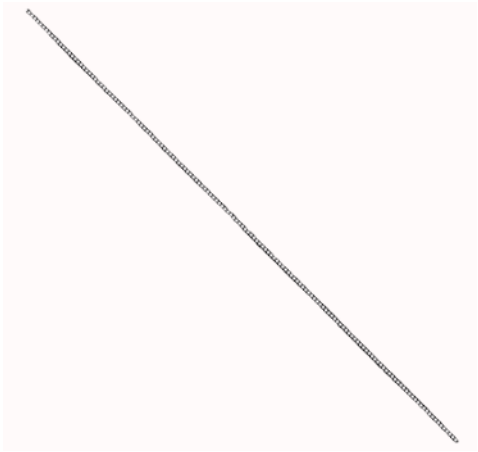


Q4. Mid-Point Line Drawing Algorithm

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

void main()
 {
  int gd=DETECT,gm ;
  // pk is decision parameter
  int x1,y1,x2,y2,dx,dy,x,y,p ;

  initgraph(&gd,&gm,"C:\\TURBOC3\\BGI");
  printf("Enter the 1st point co-ordinates :");
  scanf("%d%d",&x1,&y1);
  printf("Enter the last point co-ordinates :");
  scanf("%d%d",&x2,&y2);

  dx=x2-x1;
  dy=y2-y1;
```

```
  p=((2*dy)-dx);  // calculate p
  x=x1;
  y=y1;
  while(x1<=x2)   // checking for 2 condition of p
   {
    delay(50);
   if(p>=0)
    {
      putpixel(x,y,10);
      p=p+dy-dx;
      y=y+1;
    }
   else
    {
      putpixel(x,y,10);
      p=p+dy;
    }
    x=x+1;   // Here x value increase in both conditions

  getch();
   }

}
```

```
Enter the 1st point co-ordinates :200 200
Enter the 2nd point co-ordinates :350 350
```



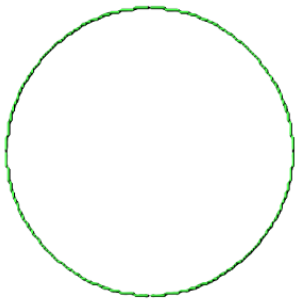
Q5. Mid-Point Circle Drawing Algorithm

```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>
void plot_pts (int ,int ,int ,int);
void main()
{
 int gd=DETECT,gm ;
 int x,y,xc,yc;
 float p,r ;

 initgraph(&gd,&gm,"C:\\TURBOC3\\BGI");

 printf("Enter the center co-ordinate :");
 scanf("%d%d",&xc,&yc);
 printf("Enter the radius :");
 scanf("%f",&r);
```

```
 x=0;
 y=r;
 p=1.25-r ;

 do{
    plot_pts(xc,yc,x,y);
    if(p<0)
 {
  p=p+((2*x)+3);
 }
    else
 {
  p=p+((2*(x-y))+1);
  y-- ;
 }
    x++ ;
  } while(x<y);

  if(x==y)
    plot_pts(xc,yc,x,y);
  getch();
}

void plot_pts(int x,int y,int x1,int y1)
{  delay(50);
```

```
  putpixel(x+x1,y+y1,GREEN);
  putpixel(x-x1,y+y1,GREEN);
  putpixel(x+x1,y-y1,GREEN);
  putpixel(x-x1,y-y1,GREEN);
  putpixel(x+y1,y+x1,GREEN);
  putpixel(x-y1,y+x1,GREEN);
  putpixel(x+y1,y-x1,GREEN);
  putpixel(x-y1,y-x1,GREEN);
}
```

```
Enter the center co-ordinate :43 56
Enter the radius :60
```



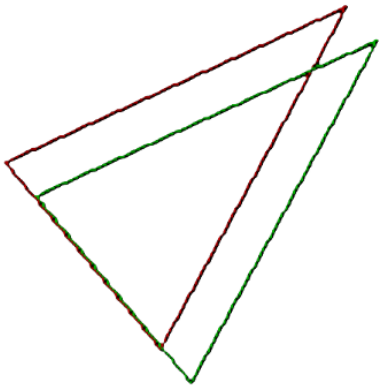
Q6. 2D Translation

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

int gd = DETECT, gm;
int n, xs[100], ys[100], i, tx, ty;

void draw();
```

```
void translate();

void main() {
   // Input number of sides of the polygon
   printf("Enter number of sides of polygon: ");
   scanf("%d", &n);

   // Input the coordinates for each vertex
   printf("Enter coordinates (x, y) for each vertex:\n");
   for (i = 0; i < n; i++) {
      printf("Vertex %d: ", i + 1);
      scanf("%d%d", &xs[i], &ys[i]);
   }

   // Input translation distances
   printf("Enter distance for translation (in x and y direction): ");
   scanf("%d%d", &tx, &ty);

   // Initialize graphics mode
   initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");

   cleardevice();

   // Draw the original polygon in RED
   setcolor(RED);
   draw();
```

```
    // Perform translation
    translate();

    // Draw the translated polygon in GREEN
    setcolor(GREEN);
    draw();

     getch();
}

// Function to draw the polygon
void draw() {
    for (i = 0; i < n; i++) {
        line(xs[i], ys[i], xs[(i + 1) % n], ys[(i + 1) % n]);
    }
}

// Function to perform translation
void translate() {
    for (i = 0; i < n; i++) {
        xs[i] += tx;
        ys[i] += ty;
    }
}
```

```
C:\TURBOC3\BIN>TC
Enter number of sides of polygon: 3
Enter coordinates (x, y) for each vertex:
Vertex 1: 60 120
Vertex 2: 120 192
Vertex 3: 192 60
Enter distance for translation (in x and y direction): 12 13
```

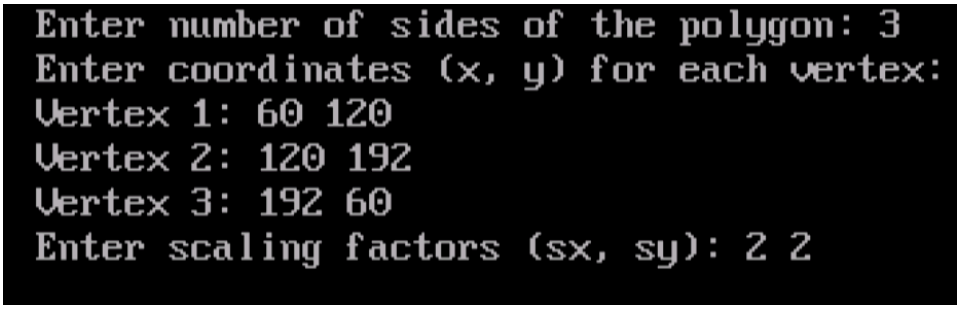


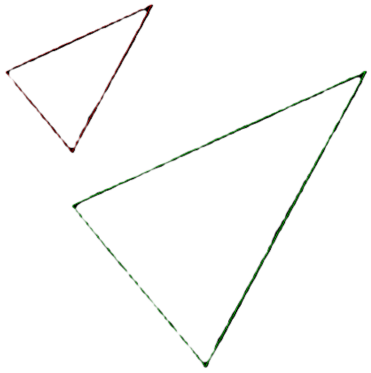
Q7. 2D Scaling

```
#include<stdio.h>

#include<graphics.h>

#include<conio.h>

#include<math.h>


int gd = DETECT, gm;

int n, x[100], y[100], i;

float sx, sy;

void draw();

void scale();


void main() {

   // Input number of sides of the polygon

   printf("Enter number of sides of the polygon: ");
```

```
scanf("%d", &n);

// Input the coordinates of the vertices
printf("Enter coordinates (x, y) for each vertex:\n");
for (i = 0; i < n; i++) {
printf("Vertex %d: ", i + 1);
scanf("%d%d", &x[i], &y[i]);
}

// Input scaling factors
printf("Enter scaling factors (sx, sy): ");
scanf("%f%f", &sx, &sy);
initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");

cleardevice();

// Draw the original polygon in RED
setcolor(RED);
draw();

// Perform scaling
scale();

// Draw the scaled polygon in GREEN
setcolor(GREEN);
draw();
```

```
    getch();
}

// Function to draw the polygon
void draw() {
    for (i = 0; i < n; i++) {
    line(x[i], y[i], x[(i + 1) % n], y[(i + 1) % n]);
    }
}

// Function to perform scaling
void scale() {
    for (i = 0; i < n;i++) {
    x[i]=x[i]* sx;
    y[i]=y[i]* sy;
    }
}
```





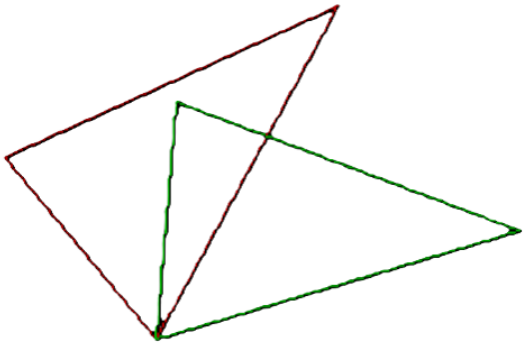
Q8. 2D Rotation

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

int gd = DETECT, gm;
int n, xs[100], ys[100], i, xPivot, yPivot;
float angleRad ,angleDeg;

// Function prototypes
void draw();
void rotate();

void main() {
   // Input number of sides of the polygon
   printf("Enter number of sides of the polygon: ");
   scanf("%d", &n);

   // Input the coordinates of the vertices
```

```
printf("Enter coordinates (x, y) for each vertex:\n");
for (i = 0; i < n; i++) {
printf("Vertex %d: ", i + 1);
scanf("%d%d", &xs[i], &ys[i]);
}

// Input pivot point for rotation
printf("Enter pivot point (xPivot, yPivot): ");
scanf("%d%d", &xPivot, &yPivot);

// Input rotation angle in degrees

printf("Enter rotation angle (in degrees): ");
scanf("%f", &angleDeg);
angleRad = angleDeg * (M_PI / 180.0); // Convert degrees to radians

// Initialize graphics mode
initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");

cleardevice();

// Draw the original polygon in RED
setcolor(RED);
draw();

// Perform rotation
rotate();
```

```
    // Draw the rotated polygon in GREEN
    setcolor(GREEN);
    draw();

     getch();
}

// Function to draw the polygon
void draw() {
    for (i = 0; i < n; i++) {
    line(xs[i], ys[i], xs[(i + 1) % n], ys[(i + 1) % n]);
    }
}

// Function to perform rotation
void rotate() {
    for (i = 0; i < n; i++) {
    int xTemp = xs[i] - xPivot;
    int yTemp = ys[i] - yPivot;

    xs[i] = xPivot + (xTemp * cos(angleRad) - yTemp * sin(angleRad));
    ys[i] = yPivot + (xTemp * sin(angleRad) + yTemp * cos(angleRad));
    }
}
```

```
Enter number of sides of the polygon: 3
Enter coordinates (x, y) for each vertex:
Vertex 1: 60 120
Vertex 2: 120 192
Vertex 3: 192 60
Enter fixed point (xfixed, yfixed): 120 192
Enter rotation angle (in degrees): 45_
```



Q9. 2D Reflection

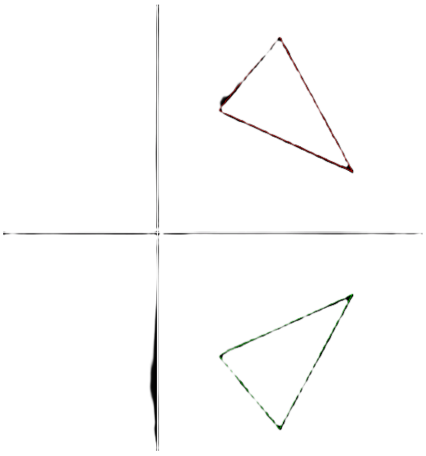
```
#include <graphics.h>

#include <stdio.h>

#include <conio.h>


int gd = DETECT, gm;

int n, xs[100], ys[100], i;

char axis;

int midX,midY;

void drawPolygon(int xs[], int ys[], int n, int color);

void reflectPolygon(int xs[], int ys[], int n, char axis);


void main() {

   printf("Enter number of sides of the polygon: ");

   scanf("%d", &n);

   printf("Enter coordinates (x, y) for each vertex:\n");
```

```
for (i = 0; i < n; i++) {
printf("Vertex %d: ", i + 1);
scanf("%d%d", &xs[i], &ys[i]);
}
printf("Enter axis of reflection (x/y): ");
scanf(" %c", &axis);
initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");

  midX = getmaxx() / 2;
  midY = getmaxy() / 2;

cleardevice();
setcolor(WHITE);
line(0, midY, getmaxx(), midY); // x-axis
line(midX, 0, midX, getmaxy()); // y-axis

// Draw the original polygon in RED
setcolor(RED);
drawPolygon(xs, ys, n, RED);

// Reflect the polygon
reflectPolygon(xs, ys, n, axis);

// Draw the reflected polygon in GREEN
setcolor(GREEN);
drawPolygon(xs, ys, n, GREEN);
```

```
    getch();

    // Close graphics mode
    closegraph();


}

// Function to draw the polygon
void drawPolygon(int xs[], int ys[], int n,int color)
 {
    int midX = getmaxx() / 2;
    int midY = getmaxy() / 2;

    for (i = 0; i < n; i++)
     {
    int x1 = midX + xs[i];
    int y1 = midY - ys[i];
    int x2 = midX + xs[(i + 1) % n];
    int y2 = midY - ys[(i + 1) % n];
    line(x1, y1, x2, y2);
     }
}

// Function to reflect the polygon
void reflectPolygon(int xs[], int ys[], int n, char axis) {
```

```
    if (axis == 'x' || axis == 'X') {
    for (i = 0; i < n; i++) {
        ys[i] = -ys[i]; // Reflect about x-axis
    }
    } else if (axis == 'y' || axis == 'Y') {
    for (i = 0; i < n; i++) {
        xs[i] = -xs[i]; // Reflect about y-axis
    }
    }
}
```

```
C:\TURBOC3\BIN>TC
Enter number of sides of the polygon: 3
Enter coordinates (x, y) for each vertex:
Vertex 1: 60 120
Vertex 2: 120 192
Vertex 3: 192 60
Enter axis of reflection (x/y): x_
```



Q10. flood_fill

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

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

void flood_Fill(int x, int y, int fill_Color, int old_Color)
  {
  if (getpixel(x, y) == old_Color)
   {
     putpixel(x, y, fill_Color); // Set the pixel to the fill color

     // To fill surrounding pixels
     flood_Fill(x + 1, y, fill_Color, old_Color); // Right side
     flood_Fill(x - 1, y, fill_Color, old_Color); // Left side
     flood_Fill(x, y + 1, fill_Color, old_Color); // Down side
     flood_Fill(x, y - 1, fill_Color, old_Color); // Up side
  }
}

void main()
 {
  int gd = DETECT, gm;
  int x, y, fill_Color, old_Color;

  initgraph(&gd, &gm, "C:\\Turboc3\\BGI");

  // A rectangle's point
  rectangle(100, 100, 200, 200);
```

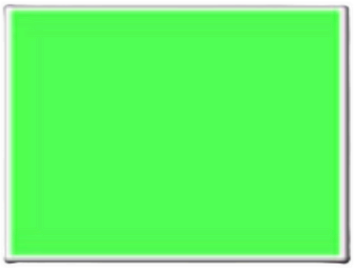
```
    // Set the starting point for filling
    x = 150;
    y = 150;

    fill_Color = RED;
    old_Color = BLACK;

    flood_Fill(x, y, fill_Color, old_Color);

    getch();
}
```

Q11. Boundary Fill

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

void boundaryFill(int x, int y, int fillColor, int boundaryColor)
 {

    if (getpixel(x,y)!= boundaryColor && getpixel(x,y)!= fillColor) {
    putpixel(x, y, fillColor); // Set the pixel to the fill color
```

```
        delay(30);
    boundaryFill(x + 1, y, fillColor, boundaryColor); // Right
    boundaryFill(x, y-1, fillColor, boundaryColor); // Left
    boundaryFill(x, y + 1, fillColor, boundaryColor); // Down
    boundaryFill(x-1, y , fillColor, boundaryColor); // Up

    }
}

void main()
{
    int gd = DETECT, gm;
    int x, y, fillColor, boundaryColor;

    initgraph(&gd, &gm, "C:\\Turboc3\\BGI");

    // Draw a closed boundary (e.g., a circle)
    circle(200, 200, 50);

    // Set_R the starting_A point_H inside the_U boundary_L
    x = 200;
    y = 200;

    fillColor = RED;
    boundaryColor = WHITE;

    boundaryFill(x, y, fillColor, boundaryColor);
```

```
    getch();
}
```



Q12. cohen-sutherland line clipping

```
 #include<stdio.h>
#include<conio.h>
#include<graphics.h>
int xwmax=300,xwmin=200,ywmax=100,ywmin=200,ax,ay,bx,by;
void input()
{
    printf("Enter TWO points (x1,y1) & (x2,y2) to Draw a line :");
    scanf("%d%d%d%d",&ax,&ay,&bx,&by);
}
void draw()
{
    rectangle(xwmin,ywmin,xwmax,ywmax);
}
void clip(int x,int y,int p[4])
{
    if(y<ywmax)
        p[0]=1;
```

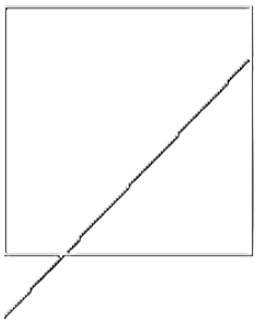
```
    if(y>ywmin)
        p[1]=1;
    if(x>xwmax)
        p[2]=1;
    if(x<xwmin)
        p[3]=1;
    else
        p[3]=0;
}
void main()
{
    int gd=DETECT,gm,y,x,c,p1[4],p2[4],p3[4],i;
    float m;
    initgraph(&gd,&gm,"C:\\TURBOC3\\BGI");
    cleardevice();
    input();
    cleardevice();
    clip(ax,ay,p1);
    clip(bx,by,p2);
    for(i=0;i<4;i++)
        p3[3]=p1[i]&&p2[i];
    for(i=0;i<4;i++)
    if(p3[i]==1)
        break;
```

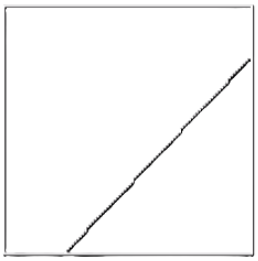
```
draw();
line(ax,ay,bx,by);
getch();
cleardevice();
if(i!=4)
draw();
else
{
m=(float)(by-ay)/(bx-ax);
if(p1[0]==1)
   y=ywmax;
if(p1[1]==1)
   y=ywmin;
if(p1[0]==1||p1[1]==1)
{
   ax=ax+(y-ay)/m;
   ay=y;
}
if(p2[0]==1)
   y=ywmax;
if(p2[1]==1)
   y=ywmin;
if(p2[0]==1||p2[1]==1)
{
```

```
    bx=bx+(y-by)/m;
    by=y;
}
if(p1[2]==1)
    x=xwmax;
if(p1[3]==1)
    x=xwmin;
if(p1[2]==1||p1[3]==1)
{
    ay=ay+m*(x-ax);
    ax=x;
}
if(p2[2]==1)
    x=xwmax;
if(p2[3]==1)
    x=xwmin;
if(p2[2]==1||p2[3]==1)
{
    by=by+m*(x-bx);
    bx=x;
}
draw();
line(ax,ay,bx,by);
}
```

```
  getch();
  closegraph();

}
```

```
Enter TWO points (x1,y1) & (x2,y2) to Draw a line :300 120 200 225
```





Q13. Bezier Curve

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

 // Line drawing function using DDA
 void drawLine(int x1, int y1, int x2, int y2) {
   int dx, dy, steps, i;
```

```
    float xIncrement, yIncrement, x = x1, y = y1;

    dx = x2 - x1;
    dy = y2 - y1;

    steps = (abs(dx) > abs(dy)) ? abs(dx) : abs(dy);

    xIncrement = dx / (float)steps;
    yIncrement = dy / (float)steps;

    for (i = 0; i <= steps; i++) {
    putpixel((int)x, (int)y, GREEN);
    x += xIncrement;
    y += yIncrement;
    delay(50);
    }
}

// bezeir curve drawing function
void drawBezierCurve(int x[], int y[]) {
    double putx, puty, t;
    for (t = 0.0; t <= 1.0; t += 0.001) {
    putx = pow(1 - t, 3) * x[0] + 3 * t * pow(1 - t, 2) * x[1] +
          3 * t * t * (1 - t) * x[2] + pow(t, 3) * x[3];
    puty = pow(1 - t, 3) * y[0] + 3 * t * pow(1 - t, 2) * y[1] +
          3 * t * t * (1 - t) * y[2] + pow(t, 3) * y[3];
```

```
    putpixel((int)putx, (int)puty, WHITE);
    }
}

void main() {
    int x[4], y[4], i;
    int gd = DETECT, gm;

    initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");

    // Input points
    for (i = 0; i < 4; i++) {
    printf("Enter x and y coordinates of point %d: ", i + 1);
    scanf("%d%d", &x[i], &y[i]);
    putpixel(x[i], y[i], GREEN); // Display the points
    }

    // Draw lines between consecutive points for clarity
    for (i = 0; i < 3; i++) {
    drawLine(x[i], y[i], x[i + 1], y[i + 1]);
    }

    // Draw the Bezier curve
    drawBezierCurve(x, y);

    getch();
    closegraph();
```

```
}
```

```
Enter x and y coordinates of point 1: 200 300
Enter x and y coordinates of point 2: 300 400
Enter x and y coordinates of point 3: 300 300
Enter x and y coordinates of point 4: 100 200
```