

Experiment 9

Aim: Implement Bezier curve.

Theory: A Bezier curve is a parametric curve which can be controlled using any number of control points. It is extensively used in computer graphics and engineering.

Algorithm:

Step 1: Take the control points coordinates as input $\begin{pmatrix} P_{0x}, P_{0y}, \dots \\ P_{1x}, P_{1y}, \dots \end{pmatrix}$

Step 2: Set $t=0$

Step 3: Set $i=0, P_x=0, P_y=0$

Step 4: Set $P_x = P_x + P_{ix} * n! * t^i * (1-t)^{n-i}$

Set $P_y = P_y + P_{iy} * n! * t^i * (1-t)^{n-i}$

Step 5: Repeat step 4 until $i \leq n$ that is repeat step 4 for all control points.

Step 6: Put pixel at P_x, P_y

Step 7: Set $t = t + 0.001$ [For whichever value is wanted, however the value, more points of the curve will be plotted].

Step 8: If $t \leq 1$, goto step 3.

The Bezier curve has been plotted !!

PROGRAM:

Code:

```
#include<stdio.h>

#include<graphics.h>

#include<conio.h>

#include<math.h>

void main(){

    int x[4],y[4],i;

    double puty,putx,t;

    int gd=DETECT,gm;

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

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

    {

        printf("Enter x and y coordinated of point %d: ",i+1);

        scanf("%d%d",&x[i],&y[i]);

        putpixel(x[i],y[i],3);

    }

    for(t=0.0;t<=1.0;t=t+0.001){

        ptx=pow(1-t,3)*x[0]+ 3*t*pow(1-t,2)*x[1]+ 3*t*t*pow(1-t,1)*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*pow(1-t,1)*y[2]+

        pow(t,3)*y[3];

        putpixel(putx,puty,WHITE);

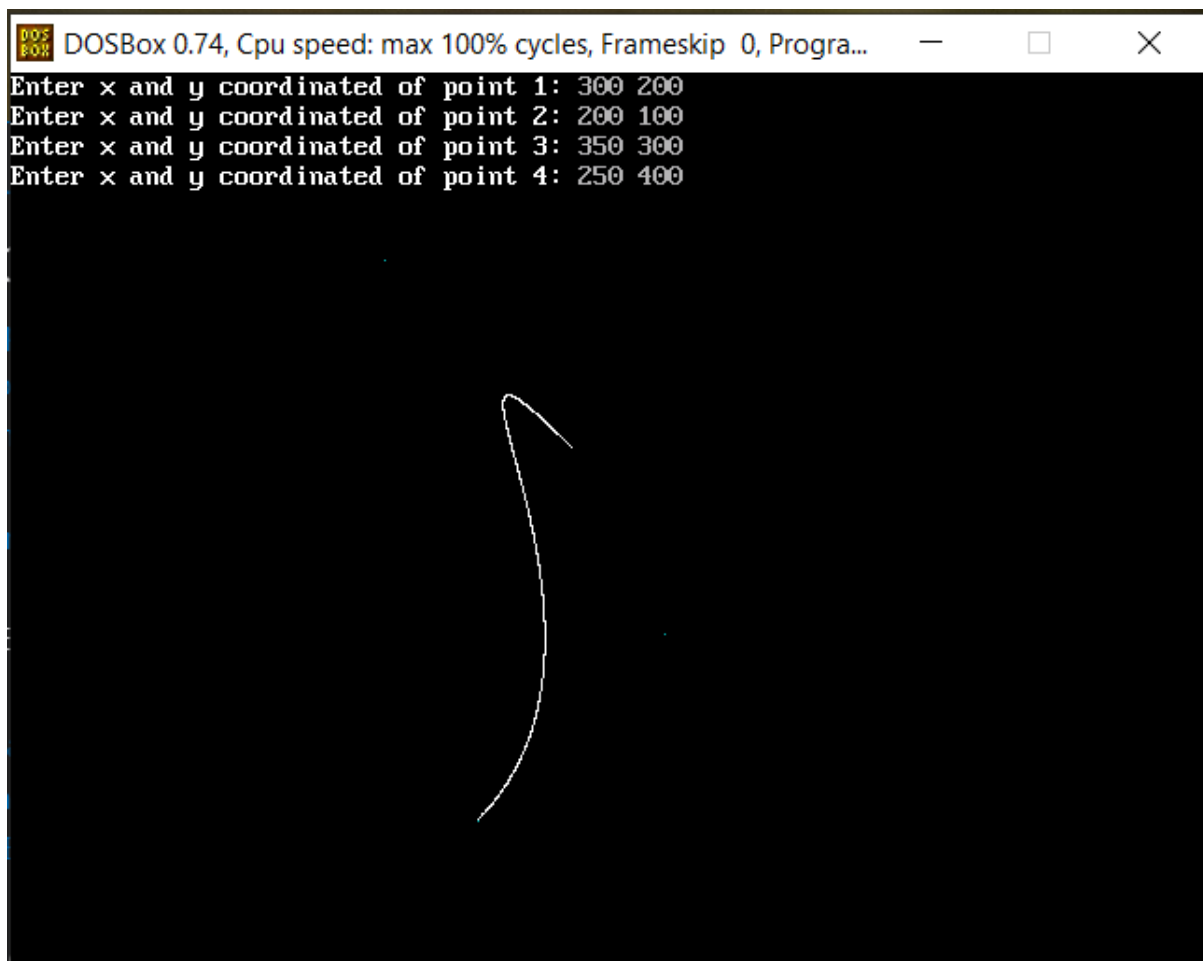
    }

    getch();

    closegraph();

}
```

OUTPUT:



DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Progra...

```
Enter x and y coordinated of point 1: 300 200
Enter x and y coordinated of point 2: 200 100
Enter x and y coordinated of point 3: 350 300
Enter x and y coordinated of point 4: 250 400
```

The image shows a DOSBox window with a black background. At the top, the title bar reads "DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Progra...". Below the title bar, there are four lines of text in a monospaced font, each preceded by "Enter x and y coordinated of point". The coordinates are: point 1: 300 200, point 2: 200 100, point 3: 350 300, and point 4: 250 400. In the center of the black area, there is a white, hand-drawn curve that starts at the bottom left and curves upwards and to the right, ending near the top right. The curve is composed of several small, connected line segments, giving it a jagged, hand-drawn appearance.