Experiment No 7

Title Generate fractal patterns using i) Bezier Koch Curve

CODE FOR Bezier Curves

```
#include <iostream>
#include <math.h>
#include <time.h>
#include <GL/glut.h>
using namespace std;
int x[4],y[4];
void init(){
 glClearColor(1.0,1.0,1.0,0.0);
 glMatrixMode(GL_PROJECTION);
 gluOrtho2D(0,640,0,480);
 glClear(GL_COLOR_BUFFER_BIT);
}
void putpixel(double xt,double yt )
{
 glColor3f(1,0,0);
 glBegin(GL_POINTS);
 glVertex2d(xt,yt);
 glEnd();
 glFlush();
}
void Algorithm(){
 glColor3f(0,1,0);
 glBegin(GL_LINES);
 glVertex2i(x[0],y[0]);
 glVertex2i(x[1],y[1]);
 glVertex2i(x[1],y[1]);
 glVertex2i(x[2],y[2]);
 glVertex2i(x[2],y[2]);
```

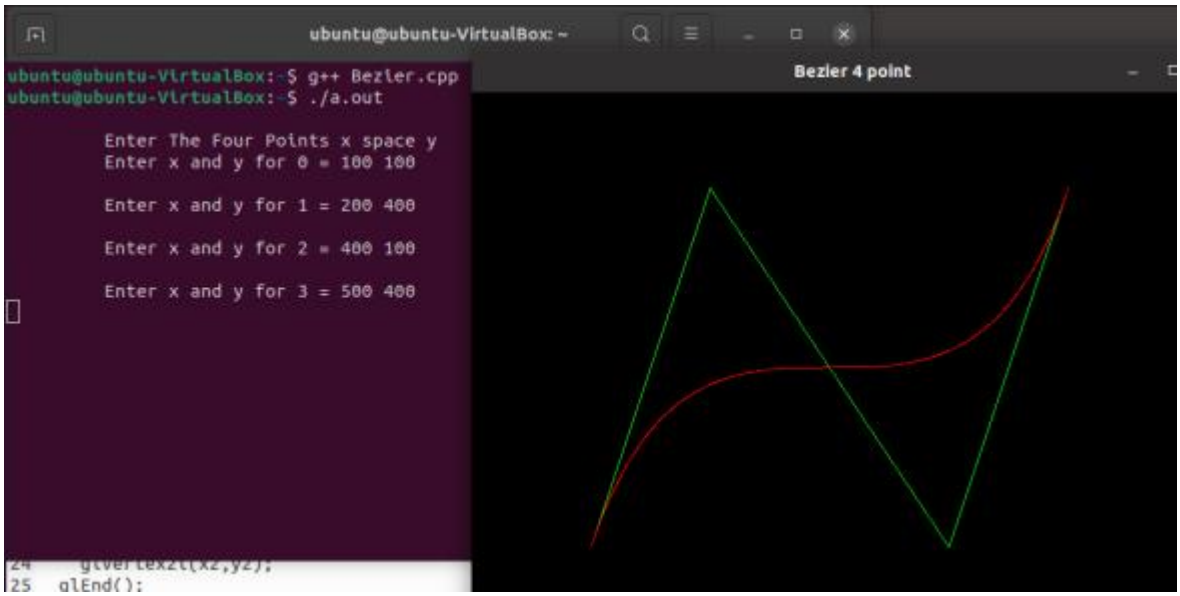
```
 glVertex2i(x[3],y[3]);
 glEnd();
 glFlush();
 double t;
 for (t = 0.0; t < 1.0; t += 0.0005)
 {
 double xt = pow(1-t, 3) * x[0] + 3 * t * pow(1-t, 2) * x[1] + 3 * pow(t, 2) * (1-t) * x[2] +
pow(t, 3) * x[3];
 double yt = pow(1-t, 3) * y[0] + 3 * t * pow(1-t, 2) * y[1] + 3 * pow(t, 2) * (1-t) * y[2] +
pow(t, 3) * y[3];
 putpixel(xt, yt);
 }
}
int main(int argc, char** argv){

 cout<<"\n \t Enter The Four Points x space y ";
 for(int i=0;i<4;i++){
 cout<<"\n \t Enter x and y for "<<i<<" = ";
 cin>>x[i]>>y[i];
 }

 glutInit(&argc, argv);
 glutInitDisplayMode(GLUT_SINGLE|GLUT_RGB);
 glutInitWindowSize(640,480);
 glutInitWindowPosition(200,200);
 glutCreateWindow("Bezier 4 point");
 init();
 glutDisplayFunc(Algorithm);

 glutMainLoop();
 return 0;
```

}



CODE FOR Koch Curve

```
#include <iostream>
#include <math.h>
#include <time.h>
#include <GL/glut.h>
using namespace std;
double x,y,len,angle;
int it;
void init(){
 glClearColor(1.0,1.0,1.0,0.0);
 glMatrixMode(GL_PROJECTION);
 gluOrtho2D(0,640,0,480);
 glClear(GL_COLOR_BUFFER_BIT);
}
void line1(int x1, int y11, int x2,int y2){

 glColor3f(0,1,0);
 glBegin(GL_LINES);
```

```
 glVertex2i(x1,y11);
 glVertex2i(x2,y2);
 glEnd();
 glFlush();
}
void k_curve(double x, double y, double len, double angle, int it){
 if(it>0){

 len /=3;
 k_curve(x,y,len,angle,(it-1));
 x += (len * cosl(angle * (M_PI)/180));
 y += (len * sinl(angle * (M_PI)/180));
 k_curve(x,y, len, angle+60,(it-1));
 x += (len * cosl((angle + 60) * (M_PI)/180));
 y += (len * sinl((angle + 60) * (M_PI)/180));
 k_curve(x,y, len, angle-60,(it-1));
 x += (len * cosl((angle - 60) * (M_PI)/180));
 y += (len * sinl((angle - 60) * (M_PI)/180));
 k_curve(x,y,len,angle,(it-1));
 }
 else
 {
 line1(x,y,(int)(x + len * cosl(angle * (M_PI)/180) + 0.5),(int)(y + len * sinl(angle *
(M_PI)/180) + 0.5));
 }
}
void Algorithm(){
 k_curve(x,y,len,angle,it);

}
int main(int argc, char** argv){
```

```
cout<<"\n Enter Starting Point x space y ";
cin>>x>>y;
cout <<"\n Lenght of line and space angle of line";
cin>>len>>angle;
cout<<"\n No. of ittration ";
cin>>it;
glutInit(&argc, argv);
glutInitDisplayMode(GLUT_SINGLE|GLUT_RGB);
glutInitWindowSize(640,480);
glutInitWindowPosition(200,200);
glutCreateWindow("Koch");
init();
glutDisplayFunc(Algorithm);

glutMainLoop();
return 0;
}
```

OUTPUT