* Assignment - 6

Title:- Curve and fractals.

Aim:- write c++ program to generate fractal pattern by using koch curves.

Co. Mapped:-

CO_5

learning objectives:-

To learn curves and fractals.

Theory:-

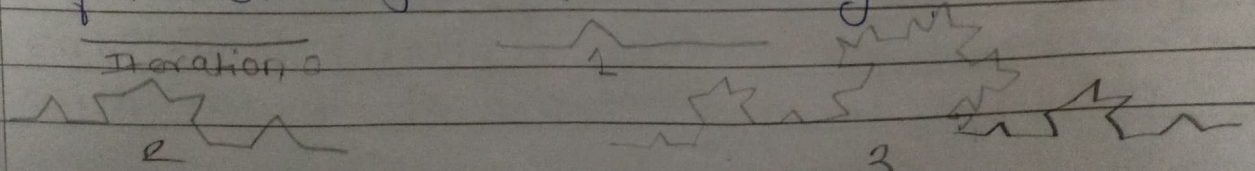
Koch curves:-

The koch curves fractal was first introduced 1904 by Helye Von koch. It was on of the first fractal object to be described. to create koch curve.

(1) Create a line and divide it into 3 parts
(2) The second part is now rotate by 60°.
(3) Add another part which goes from the end of one part 2 to +ve beginning of part 2.
(4) Repeat above steps with each part of the line.

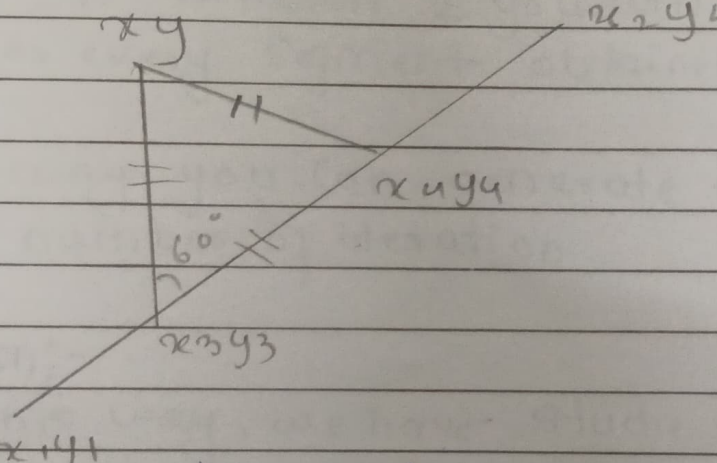
we will get following koch curve as number of iteration goes on increasing

Iteration 0



Step 1:- In iteration 0, we have a horizontal line.

Step 2:- In iteration 1, ~~it~~ line is divided into 3 equal parts Middle part of a line is rotated in 60° because it forms a perfect equilateral triangle.



Here (x_1, y_1) and (x_2, y_2) is accepted from user Now, we can see line is devided into 3 equal segment co-ordinates of middle two points will be calculated as follows:

$x_3 = (2x_1 + x_2) / 3;$

$y_3 = (2y_1 + y_2) / 3;$

$x_4 = (x_1 + 2x_2) / 3;$

$y_4 = (y_1 + 2y_2) / 3;$

In our curve, middle segment (x_3, y_3) (x_2, y_2) will not be drawn, Now, in order to find out co-ordinates of the top vertex (x, y) of equilateral triangle we have rotate point (x_4, y_4) with respect to arbitrary point (x_3, y_3) by

angle of 60° in anticlockwise direction. After performing this rotation we will get rotated co-ordinates (x, y) as.

$$x = x_3 + (x_4 - x_3)\cos\theta + (y_4 - y_3)\sin\theta.$$
$$y = y_3 - (x_4 - x_3)\sin\theta + (y_4 - y_3)\cos\theta.$$

Step 3- In iteration 2 you will repeat step2 for every segment obtained in iteration 1.

In this way you can generate koch curve for any number of iteration.

Conclusion:-

In this way, we have studied and implemented koch curve.