

## ITERATED FUNCTION SYSTEMS

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CATEGORY: Fractals

### APPLICATION:

Iterated Function Systems are based on mappings of the form

$$x_{\text{new}} = ax + by + e$$

$$y_{\text{new}} = cx + dy + f$$

and , beginning with a point, using maps of this form to iteratively generate new points. The default drawing is the Sierpinski triangle which uses three mappings.

For the figures demonstrated in this application, the fern and bush and tree use four such mappings.

Different coefficients give rise to different patterns. For example, negating coefficient  $b$  in Map4 of the fern causes it to be drawn with the top turned left. Increasing the probability in Map1 for the fern or tree cause the "trunk" to be darker. Experiment with other changes.

To construct a scene rather than just individual pictures, the user may change the position of the drawing by moving the cursor to the general position of the desired drawing and clicking the mouse. Note the corresponding changes to  $x_{min}$ ,  $x_{max}$ ,  $y_{min}$ , and  $y_{max}$ .

USE: This application is used to illustrate iterated function systems in graphics classes and in mathematics classes and give students opportunity to change the coefficients to change the figure drawn.

DEVELOPMENT: NeXTSTEP 2.0