FRACTAL

PURPOSE

Generate a fractal sequence from a set of points.

DESCRIPTION

Given as set of points in the variables X1 and Y1, this command generates the following sequence:

 $\begin{array}{l} X2(1) = X1(1) \\ X2(2) = X1(1) + (1/3)DELX \\ X2(3) = X1(1) + (1/2)DEXLX - (SQRT(3)/6)DELY \\ X2(4) = X1(1) + (2/3)DELX \\ X2(5) = X1(2) \\ Y2(1) = Y1(1) \\ Y2(2) = Y1(1) + (1/3)DELY \\ Y2(3) = Y1(1) + (1/2)DELY - (SQRT(3)/6)DELX \\ Y2(4) = Y1(1) + (2/3)DELY \\ Y2(5) = Y1(2) \end{array}$

where DELX is the difference between 2 successive points in the X1 variable (i.e., DELX(I) = X1(I+1)-X1(I)) and DELY is the difference between 2 successive points in the Y1 variable (i.e., DELY(I) = Y1(I+1)-Y1(I)). This is the type of fractal that can be used to generate a Koch snowflake or a Koch curve.

SYNTAX

<SUBSET/EXCEPT/FOR qualification>

where $\langle x1 \rangle$ is a variable;

<y1> is a variable (same length as <x1>);

<x2> is a variable where the computed fractal sequence corresponding to <x1> is saved (4 times as long as <x1>); <y2> is a variable where the computed fractal sequence corresponding to <y1> is saved (4 times as long as <y1>); and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET Y2 X2 = FRACTAL Y1 X1

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

FRACTAL PLOT	=	Generate an iterated function system type fractal plot.
CANTOR NUMBERS	=	Generate a sequence of Cantor numbers.
LOGISTIC NUMBERS	=	Generate numbers from the logistic sequence.
JULIA	=	Compute a Julia set.
PHASE PLANE DIAGRAM	=	Generate a phase plane diagram.
PLOT	=	Plots data or functions.

REFERENCE

"Infinity and the Mind," Rucker, (page 9).

APPLICATIONS

Chaos

IMPLEMENTATION DATE

88/7

PROGRAM 1 READ X1 Y1

01 0.5 0 11 01 END OF DATA MULTIPLOT 2 3 MULTIPLOT CORNER COORDINATES 0 0 100 100 LIMITS 01 TIC OFFSET 0.4 0.4 FRAME OFF FRAME CORNER COORDINATES 5 5 95 95 TITLE OFFSET 1 PRE-SORT OFF TITLE ORIGINAL DATA PLOT Y1 X1 LOOP FOR K = 2.1.6LET J = K - 1LET Y2 X2 = FRACTAL Y1 X1 TITLE KOCH SNOWFLAKE ITERATION ^K PLOT Y2 X2 LET X1 = X2LET Y1 = Y2END OF LOOP END OF MULTIPLOT



PROGRAM 2

. Draw a Koch curve through several iterations READ X1 Y1 0 010END OF DATA MULTIPLOT 2 3 MULTIPLOT CORNER COORDINATES 0 0 100 100 LIMITS 01 TIC OFFSET 0.4 0.4 FRAME OFF FRAME CORNER COORDINATES 5 5 95 95 TITLE OFFSET 1 PRE-SORT OFF TITLE ORIGINAL LINE PLOT Y1 X1 LOOP FOR K = 2.1.6LET J = K - 1LET Y2 X2 = FRACTAL Y1 X1 TITLE KOCH CURVE ITERATION ^K PLOT Y2 X2 LET X1 = X2LET Y1 = Y2END OF LOOP END OF MULTIPLOT

