

## Computer Graphics Project #1 : Barnsley's Fractal Fern

The Barnsley's fern is a fractal created by an iterated function system, in which a point (the seed) is repeatedly transformed by using one of four transformation functions.

The transformations are affine transformations of form

$$x' = ax + cy + e$$

$$y' = bx + dy + f$$

And so each transformation can be specified by six constants a, b, c, d, e, and f. These constants defined over 4 functions.

$$f1: x_{n+1} = 0; \quad y_{n+1} = 0.16 y_n \quad \text{where } (a=0, b=0, c=0, d=0.16, e=0, f=0)$$

$$f2: x_{n+1} = 0.85 x_n + 0.04 y_n; \quad y_{n+1} = -0.04 x_n + 0.85 y_n + 1.6 \\ \text{where } (a=0.85, b=-0.04, c=0.04, d=0.85, e=0, f=1.6)$$

$$f3: x_{n+1} = 0.2 x_n - 0.26 y_n; \quad y_{n+1} = 0.23 x_n + 0.22 y_n + 1.6 \\ \text{where } (a=0.2, b=0.23, c=-0.26, d=0.22, e=0, f=1.6)$$

$$f4: x_{n+1} = -0.15 x_n + 0.28 y_n; \quad y_{n+1} = 0.26 x_n + 0.24 y_n + 0.44 \\ \text{where } (a=-0.15, b=0.26, c=0.28, d=0.24, e=0, f=0.44)$$

Map the pixels using `glVertex3f(x, y, 0)` for n iterations (ex: n = 200000) where

1% of the times choose coordinate transformation with f1,

85% of the times choose coordinate transformation with f2,

7% of the times choose coordinate transformation with f3,

7% of the times choose coordinate transformation with f4,

for a given random number.

Include your *Name, ID, Class* and *Project Name* at the top of the code. Please comment your code describing what each of your code line dose. Save the file as "projectXX.cpp"