EECS 639

Project 3

The rough draft for the project was pair programmed by Austin and Gabby, the subsequent changes and fixes after emailing with Professor Shontz were performed by Gabby. Austin was responsible for Part D and did not follow through because he got in a car accident. The report was compiled by Austin

Austin Bailey: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_

Gabrielle Gasser: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_

%function placeholder = Fractal(argument)

%colormap = blanks(150,150);

%colormap = reshape(blanks(22500),150,150);

colormap = blanks(22500); %char array for colors

k = 1; %just a counter

z = zeros(1, 22500); %complex points

x=linspace(.15,.55,150);

y=linspace(-.15,.15,150);

for i=1:150

for j=1:150

z(k) = complex(x(i), y(j));

colormap(k) = Newton(z(k)); %using Newton's method to fill colormap

k = k+1;

end

end

for i=1:22500 %drawing the actual fractal

plot(z(i), 'color', colormap(i), 'marker', '.');

hold on;

end

%plot(z, 'color', colormap(i), 'marker', '.');

function color = Newton(z)

x1 = z; %initial answer to be updated

x2 = 0; %checks difference between previous and current

for i=2:21

if(abs(x2)<0.0001)

if(x1 == -1) % root 1 was found

color = 'y';

return;

end

if(x1 == 1) %root 2 was found

color = 'r';

return;

end

if(x1 == -0.4i) %root 3 was found

color = 'b';

return;

end

if(x1 == 0.4i) %root 4 was found

color = 'g';

return;

end

end

%performing newtons method

x2 = x1 - (((x1^2-1)\*(x1^2+.16))/(4\*x1^3 - 1.68\*x1));

x1 = x2;

x2 = x2 - x1;

end

color = 'k';

% f = (z^2-1)(z^2+.16)

% fprime = 4z^3 - 1.68z

% Input:

% z = complex number

%

% Output:

% color = the color associated with the root found by Newton’s Method

% according to the following key:

% color = ’y’, if Newton’s Method found z\_1

% ’r’, if Newton’s Method found z\_2

% ’b’, if Newton’s Method found z\_3

% ’g’, if Newton’s Method found z\_4

% ’k’, if Newton’s Method was unsuccessful

% after 20 iterations.

% More precisely, "unsuccessful" means that Matlab cannot reduce

% (z^2-1)(z^2+0.16) to less than 0.0001 (in absolute value) in at most

% 20 Newton iterations.