4330 Assignment 12 *

June 4, 2020

Write your code for the following problems in a single file named:

`hw12-`*lastname*`.py`

This assignment is another example of how interestingly complicated behavior can arise from a system defined with simple rules. For a complex number $c \in \mathbb{C}$, consider the sequence defined by

$$\begin{aligned} z_0 &= 0, \\ z_{n+1} &= z_n^2 + c, \qquad \text{for } n \geq 0. \end{aligned}$$

Depending on the value of c, this sequence may converge, diverge to infinity, or diverge while remaining bounded.

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(1) (20 points) In the given file, complete the function `Iterate(c, N)` as described in the comments in the given file `hw12.py`; you should compute terms $z_0, z_1, z_2, \ldots$ in the sequence defined above until either (i) an element z_k is found with $|z_k| > 100$ or (ii) the N-th term has been computed. Then return the number of terms which were computed. The existing code will plot each point with a color that depends solely on this return value.

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(2) (10 points) This code has callback functions so that the arrow keys can be used to change the location and the equal and minus keys can be used to zoom in and out respectively. Find an interesting location to take and submit a screenshot from.

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