CTA200 2022 Assignment 3

DUE: Tuesday May 10th by 1:00 PM

Submit all of your code in a .ipynb file. Please clear all output before commiting your file to Github. You will also submit a .tex file, as described in Question 3. You can see the .tex file for this assignment as a sample of how to get started. I also suggest that those of you new to Latex try out the Overleaf cloud based Latex editor.

Question 1

For each point in the complex plane $c = x + iy$, with $-2 < x < 2$ and $-2 < y < 2$, set $z_0 = 0$ and iterate the equation $z_{i+1} = z_i^2 + c$. Note what happens to the z_i's: some points will remain bounded in absolute value $|z|^2 = \Re(z)^2 + \Im(z)^2$, while others will run off to infinity. Make an image in which your points c that diverge are given one color and those that stay bounded are given another. Make a second image where the points are coloured by a colourscale that indicates the iteration number at which the given point diverged.

For this question, put the code that does the iteration in a function and place this function in a separate .py file which you import in your .ipynb. Perform the plots in the notebook.

Question 2

To be posted soon.

Question 3

Writeup your results in a latex file which includes at least one plot for each of the questions as well as a description of the methods and the result. Submit the .tex file and a pdf generated from it.

How to Submit

Submit your assignment by creating a folder called assignment_2 in your repository from Assignment #1 and put the notebook, the .py files, the `LaTex` file and the PDF output from `LaTex` as well as any other files which are necessary for me to run your code. Commit the files and push to github. No need to email me your repo again since I have the URL from assignment 1.