CTA2002-A3

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1 Question 1

- Methods: For this question, I define convergence at z_n to be:

$$\|z_{n+1}\| < \|z_n\|$$

for some $z_n \in \mathcal{C}$ before 40 iterations. I firstly create a grid of 100*100 and loop through 40 iterations for each point to see if there is any signs of convergence.

- The results shall be found as follows:

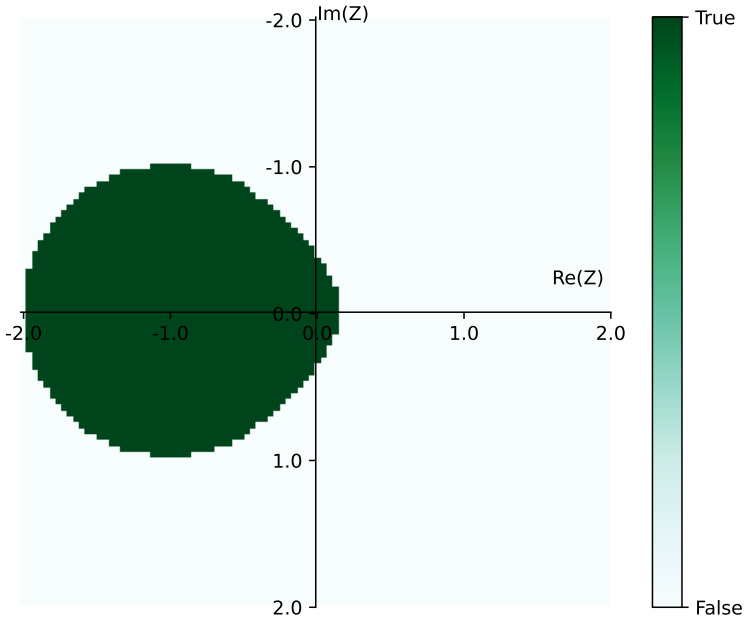

Figure 1: Result of the convergence test. Note that True stands for converges and False stands for no sign of convergence in 40 iterations.

It does appear that points that converges are in a ball centered around -1. This make sense because $\text{Re}(z)$ will eventually push the sequences to converge

2 Question 2

- Methods: For this question, I adopt the finite step method to solve the coupled system of ODEs.
- Results: The solutions of the system of ODE projected $x - y$ and $y - z$ plane shall be found below:

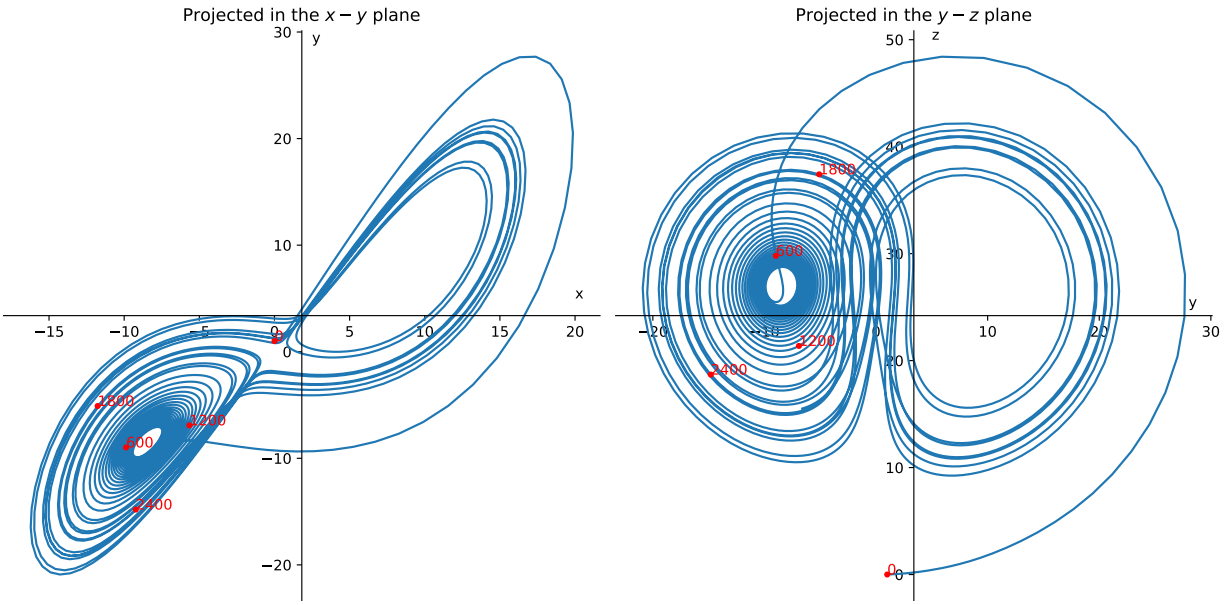

Figure 2: The projected view of the solutions, left: the projection on the x, y plane; right: The projection on the y, z plane. Note that the labeled red dots stands for the value of x, y, z on the nth iteration.