Feras Natsheh
Professor Singh
PHYS-300: Computational Methods in Physics
December 13, 2023

Final Project Self Assessment

Throughout the project, I enjoyed working with Colby on a project of our choice, that both of us were equally invested in. I started reading the book Chaos by James Gleick shortly after the week we visited deterministic chaos in class, and have been greatly interested in modeling some chaotic systems since. Modeling the aspects of deterministic chaos in three-body systems was an interesting and enjoyable experience. Colby and I started the project with a broad approach to a three-body problem, but as we delved deeper, we realized the potential aspects of physics, math, and astronomy that we could connect three-body systems to. So, we narrowed our focus on deterministic chaos in such systems.

My responsibility was to derive the set of differential equations that govern our system, and implement them with an ODE solver in Python. Meanwhile Colby tackled different animation packages and got a handle on Manim animations and Object-Oriented Design. Afterwards, I worked on and off developing the skeleton of our code for Manim, and Colby and I shared an equal amount of effort into everything that followed.

After realizing that some of the computations are time-consuming, we implemented a more discrete approach to checking the sensitivity of the system to initial conditions. The approach was to create an array of evenly spaced masses and positions and run loops over each mass or position, separately, for a body in the system, while holding the rest of the bodies and their initial configurations constant. The result was a plot of the final state of the system plotted against the choice of mass or position at that iteration.

The project was intellectually challenging and stimulating. I enjoyed working with Colby, he was as passionate about the project as I was, and we both complemented each other's work well.