E Field Plot:

The purpose of this project was to generate a graphical representation of the relationship between charge density and electric field. To start off with, I came up with a vector equation for E-Field. The most important equation in this project was Maxwell’s equation. Which demonstrates the relationship between charge density and the divergence of the E-Field. I thought it was really interesting how there are real world applications to the topics we learned in multivariable class. In lines 9-12, the function *meshgrid* developed a two-dimensional graph of x and y values, which was then substituted into the Electric field equation for x in order to allow both the *contour* and *quiver* functions to work. The *contour* function developed the rings, demonstrating charge density, while quiver generated the arrows on the graph. It was interesting to see how with uniform charge density in the center of the plot, the electric field was also uniform, in both direction and magnitude. After plotting charge density and electric field, I utilized the Lorentz force equation to calculate the force in three dimensions generated by both electric and magnetic field. I made up a particle with initial conditions (velocity and charge), and a B field. I did the cross product between velocity and B field to calculate the direction of the force. It was interesting to see how the B field is always perpendicular to the force, while the E field was parallel to it.