Report 1:

For this week I made my first attempt at simulating quantum tunnels using the time-independent Schrödinger equation. In the code I have the variables defined for the constants and a fucntion to define the potential barrier. A iterative method is being used to solved the time-independent Schrödinger equation numerically for the given barrier. In this method it uses a loop that goes until the error is below the tolerance level that is set. The next lines of code in the loop are meant for solving the Schrödinger equation. From this an approximation of the wave function is given. The findings from the two graphs produced by the two graphs using different values for the mass and energy of the particle, in graph 1 the mass = 1 and energy = 0.6 and in graph 2 mass = 0.1 and energy = 1. In both graphs the probability density can only be seen very faintly but it can be seen that there is a portion past the barrier which I think is a good sign as it shows that quantum did occur. Howeverm this is not a good representation of the phenomena and it is not what I was hoping to accomplish for the first milestone. The code will needed to be revised, I believe the problem is in how I am solving the Schrödinger equation, a different method will need to be used so that I get better results. The main challenged faced for this milestone was firstly understanding quantum tunneling so that I could make sure what I was doing would be correct. Having to read up on the subject and looking through examples, which was why I had chose the time-independent equation to try out for the simulation but the time-dependent equation might be better to use, I am unsure on that assumption but will try it out so that I can have a comparison between the equations. I will need to read more on the subject than what I have so far to know for sure. The future for this project is to read further on the subject and looking at some tutuorials that I had come across but did not have time to watch. After completing that, the following step is to revise the code for solving the time-independent Schrödinger equation and if time permits it

make an attempt at a simultion with the time-dependent equation. The goal of the revision is to produce a graph where quantum tunneling can be seen ocurring clearer. Sources for this first milestone have been

https://phys.libretexts.org/Bookshelves/University_Physics/Book%3A_University_Physics_(OpenStax)/University_Physics_III_-_Optics_and_Modern_Physics_(OpenStax)/07%3A_Quantum_Mechanics/7.07%3A_Quantum_Tunneling_of_Particles_through_Potential_Barriers

and Chatgpt. For helping me understand the topic and getting the code to work.