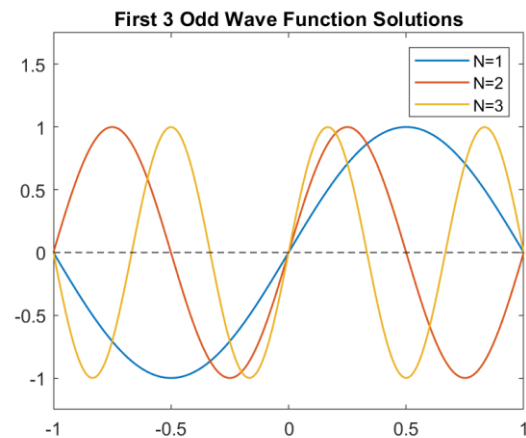
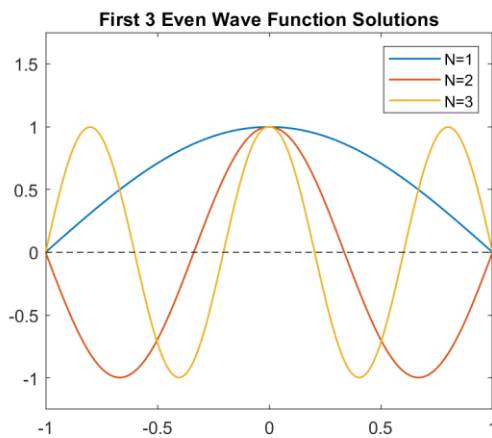
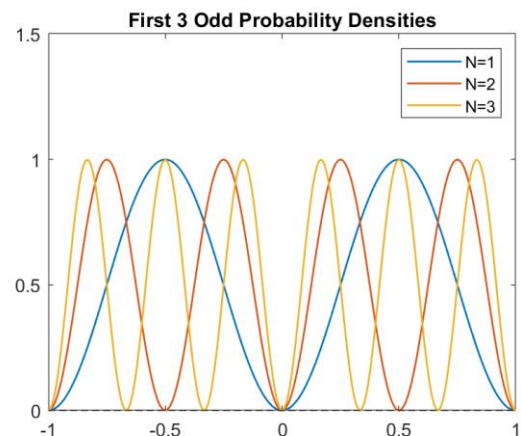
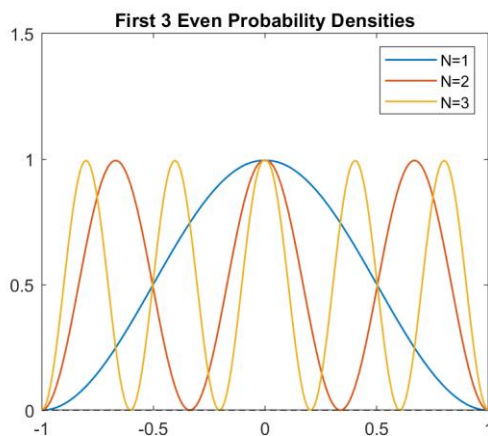


Quantum Mechanics Lab 1

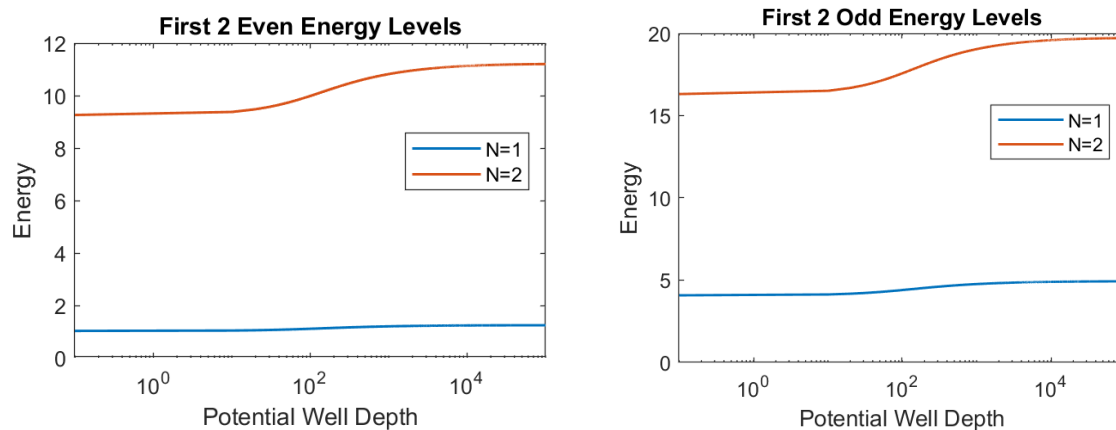
1. All tests passed in Matlab grader for problem 1.
2. All tests passed in Matlab grader for problem 2.
3. All tests passed in Matlab grader for problem 3.
4. All tests passed in Matlab grader for problem 4.
5. Below are the plots for the first 3 wave functions for both even and odd solutions. The next solution is the previous solution plus another wavelength.



6. Below are the plots for the first 3 probability densities for both even and odd solutions. When compared to the wave functions above the particles are most likely to be found in the peaks and valleys.



7. The unconverged wave functions are not allowed because they exhibit wave function values greater than zero outside the bounds of the box. This would mean that there could be a particle outside the box in the area of high potential, but this is not possible.
8. Below are the plots of the energy values for the first two even and odd solutions. As the well depth is decreased then there is not as much of a barrier keeping the particle inside the box. As the well depth increases the energy value approaches a specific value. The table below also shows the difference between the energy values from the Matlab plots (all with well depth $1e5$) and those calculated with the equation from the readme file. It seems that as the well depth increases to infinity then the Matlab solutions would approach the calculated solutions.



	Even		Odd	
Solution	E (Matlab)	E (calculated)	E (Matlab)	E (calculated)
N = 1	1.2449	1.2337	4.9296	4.9348
N = 2	11.2023	11.1033	19.7139	19.7392
N = 3	31.1072	30.8425	44.3381	44.4132

9. Below are plots of the probabilities for the first two energy levels of the even function. Each line represents a different well depth. Well depths were varied between 0.1 and $1e5$. The peaks in the probability density plots increase as the well depth increases. For the second energy level it is evident that some lines show a nonzero probability outside of the box. As well depth increases the nonzero probability outside the box is reduced to nothing with a large well depth. This is because the higher the potential barrier the less likely the particle is to tunnel through it. Energy level two eventually goes to zero as well depth is increased.

