1 The Heteronuclear Diatomic Molecule

1. By now you should have a working python code for the homonuclear diatomic molecule. Use the code to do the following:

1. Modify the code to consider N, identical, evenly-spaced atoms instead of just 2. Plot some of the wavefunctions for $N = 5, 10, 20, 50$

2. Today we learned that each eigenfunction has a corresponding θ value associated with it. Make a plot of eigenvalues vs. θ for $N = 5, 10, 20, 50$. Your plot should begin to look similar to figure 3.6 in Sutton. Remember that $E(\theta) = E(-\theta)$.

3. Use hypothesis and testing to figure out what physical quanties affect the width of the band of eigenenergies that you plotted in part (2).