# AMATH 403/503 Homework Assignment #4

Spring, 2019

1. Consider the sound waves governed by



in a circular cylinder of radius *a* and length *L*.



Assume that the sound produced in this tube is symmetric, i.e. no  dependence. Find the lowest three frequencies. Take 

2. Consider the wave function   for an electron of mass  in a sphere surrounded by an infinite potential at a radius *a* from the nucleus, which just means that 



Find the energy levels for the symmetric case, where  does not depend on  . Your answer should be exact and in terms of parameters given.

3. Consider the Legendre’s equation:



Compute the first four coefficients in the Legendre expansion (similar to Fourier sine or cosine series expansion):



for 

Plot the approximation of the sum consisting of one, two, three and four terms along with the original function 