

Math 454/554 Assignment 6

Due Tuesday, 11/23

- 1) #2, Section 61
- 2) #3 a), Section 61
- 3) #6, Section 70
- 4) #8, Section 70
- 5) #1, Section 72
- 6) (only mandatory for graduate students)

a) Use Mathematica or Matlab or whatever you prefer to plot the Bessel function $J_0(x)$ on the interval $[0, 20]$. In Mathematica, you can use the command “BesselJ.” Make a rough estimate of the first three zeros of $J_0(x)$.

b) Actually determine the first three zeros. In Mathematica, you can use the command “BesselJZero.”

c) If the zeros are z_1 , z_2 , and z_3 , plot $J_0(z_1x)$, $J_0(z_2x)$, and $J_0(z_3x)$ on the interval $[0, 1]$. Observe that these are all solutions to the equation $-\text{Laplacian}u = \lambda u$ for appropriate values of λ . (radially symmetric?).