Math 216–W19 Written Homework 4

Instructions: Solve each of these problems. Your solution should be complete and written out in complete sentences. Where graphs are needed, you may include a print-out of output from *Matlab* (or another program, if you prefer).

1. Problem 25 in §5.4 of Brannan and Boyce (p.327 in the 3rd ed. text).
2. Problem 18 in §5.6 of Brannan and Boyce (p.343 in the 3rd ed. text).
3. In lab 4 we consider the equation $y'' + 2\gamma y' + \omega_0^2 y = -k\delta(t - T)$. In this problem we consider this problem analytically.
   (a) First consider the case we examine in lab, $y'' + 36y = -k\delta(t - T)$, $y(0) = 0$, $y'(0) = 1$. Find the period T of the unforced response and then solve the problem with Laplace transforms to determine the value of k that will result in the solution being identically zero for all $t \geq T$.
   (b) Now consider $y'' + y' + 36 = -k\delta(t - T)$, with $y(0) = 0$, $y'(0) = 1$. Repeat your analysis from (a) to find a value of k that will result in the solution begin identically zero for all $t \geq T$.
   (c) Plot your solutions from (a) and (b) to verify that they do as you expect.
4. Problem 8 in §6.2 of Brannan and Boyce (p.399 in the 3rd ed. text). Also complete (a) below.
   (a) Find the eigenvalues and eigenvectors of the coefficient matrix for this system to obtain a(nother?) fundamental solution set for the system.