MAE 3724, Systems Analysis and Introduction to Controls

PreLab for MATLAB Lab 2 – `Plotting, TF, Step, iLaplace and ode45`

To submit this work, you will be uploading a modified version of this MS Word file to Canvas.

1. Download and run the following four files from our Canvas course page:

a) SimplePlotting.m
b) tf_demo.m
c) InverseLaplace.m
d) SecondOrderODE.m

Bring those four files with you on your computer when you come to lab. During the lab, you will be modifying these files to solve other problems.

2. Modify SimplePlotting.m to do the following:

a) Plot $e^{-x} sin^2(x)$ from x=0 to x=6 pi, using 500 points, titles and labels
b) Plot $e^{-x}\cos^2(2x)$ from x=0 to x=6 pi, using 500 points, titles and labels
c) Plot both on the same graph, using titles, labels and a legend

Paste your Matlab script and your plots for problem-2 here!

3. Modify tf_demo.m to do the following:

a) Use the tf() function to define a system variable for: $\dddot{x}+4\ddot{x}+6\dot{x}+8x=f(t)$
Use the step() function to plot the response of the system for $f(t)=u(t)$ (a unit step).

Paste your Matlab script and your plot for problem-3 here!

4. Modify InverseLaplace.m to do the following:

a) Use ilaplace to determine the inverse laplace transform for: $\dfrac{2s+1}{(s)(3s^2+4s+20)}$

Paste your Matlab script and results for problem-4 here!

5. Modify – SecondOrder ODE.m to do the following:

a) Use the ode45() function to plot the solution for: $\dddot{x}+4\ddot{x}+6\dot{x}+8x=f(t)$ where $f(t)=u(t)$ (a unit step) over the range 0 to 10 seconds. All initial conditions are zero.
Plot the position and velocity on separate graphs

Paste your Matlab script and your plot for problem-4 here!