CMPE323 Signals and Systems Fall 2016
Homework #4 Assigned 10/12/2016, **Due 10/19/2016**

Your Name Here
"CMPE323" Here
Due Date: Here

Rules for all homework:

1. $8\frac{1}{2}\times 11$ paper, no perforations. (Not torn from spiral bound notebook) Lined, unlined, or grid is OK.
2. Name, date, and CMPE323 HW## on all assignments in upper right of first page.
3. You may write on both sides of paper. Include MATLAB code listings for MATLAB exercises and plotted output. You don't need to include MATLAB code if you just use MATLAB to sketch the required outputs.
4. Single staple in upper left. STAPLE – NOT FOLD! STAPLE – NOT PAPER CLIP! STAPLE!

Failure to follow these simple rules will result in a score of 0 for that homework.

CMPE323 HW04

Given the differential equation $3\frac{d^3y}{dt^3}+24\frac{d^2y}{dt^2}+2\frac{dy}{dt}+y=\frac{d^2x}{dt^2}+x$

1) Write the corresponding integral equation for the causal LTI system that implements this linear constant coefficient differential equation. Show the integrals explicitly.

2) Explain how the initial conditions of the various integrals in 1) are established and why.

3) Draw the Type II Direct Form (canonical) block diagram for the equation using the standard block diagram elements of integrators, scalars, and adders.

4) Write the Laplace Transform of the impulse response of the system described by this differential equation.

5) Find the zeros of the Laplace transform of impulse response.

6) Find the poles of the Laplace transform impulse response. *Hint: Research the MATLAB function* roots. *Hint #2: Are there complex poles? Do they occur in conjugate pairs.*

7) Perform the Partial Fraction Expansion of the impulse response.

8) Write the impulse response of this system as a function of time.