Homework #4: ECE 461 / 661

LaPlace Transforms. Due Monday, September 15th

LaPlace Transforms

1) Assume X and Y are related by the following transfer function

$$Y = \left(\frac{10(s+3)}{(s+2)(s+5)(s+10)} \right) X$$

a) What is the differential equation relating X and Y?

b) Determine y(t) assuming

$$x(t) = 4\cos(3t) + 5\sin(3t)$$

c) Determine y(t) assuming x(t) is a unit step input

$$x(t) = u(t)$$

2) Assume X and Y are related by the following transfer function:

$$Y = \left(\frac{100}{(s+1+j5)(s+1-j5)(s+30)} \right) X$$

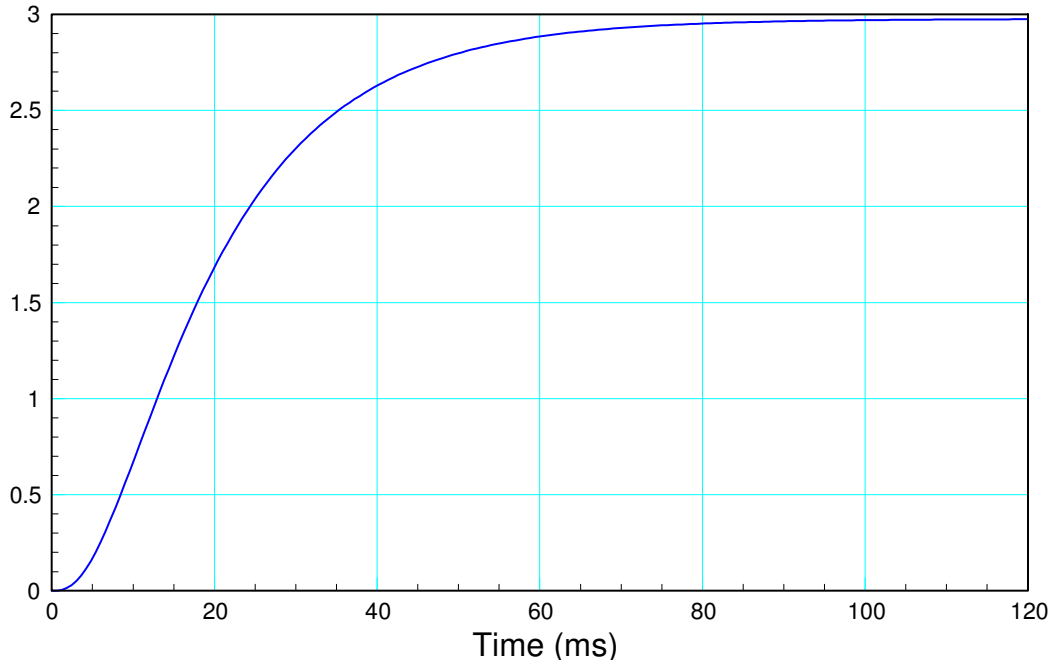
a) Use 2nd-order approximations to determine

- The 2% settling time
- The percent overshoot for a step input
- The steady-state output for a step input (x(t) = u(t))

b) Check your answers using the 3rd order model and Matlab, Simulink, of VisSim (your pick)

(over)

3) Determine the transfer function for a system with the following step response:



4) Determine the transfer function for a system with the following step response: