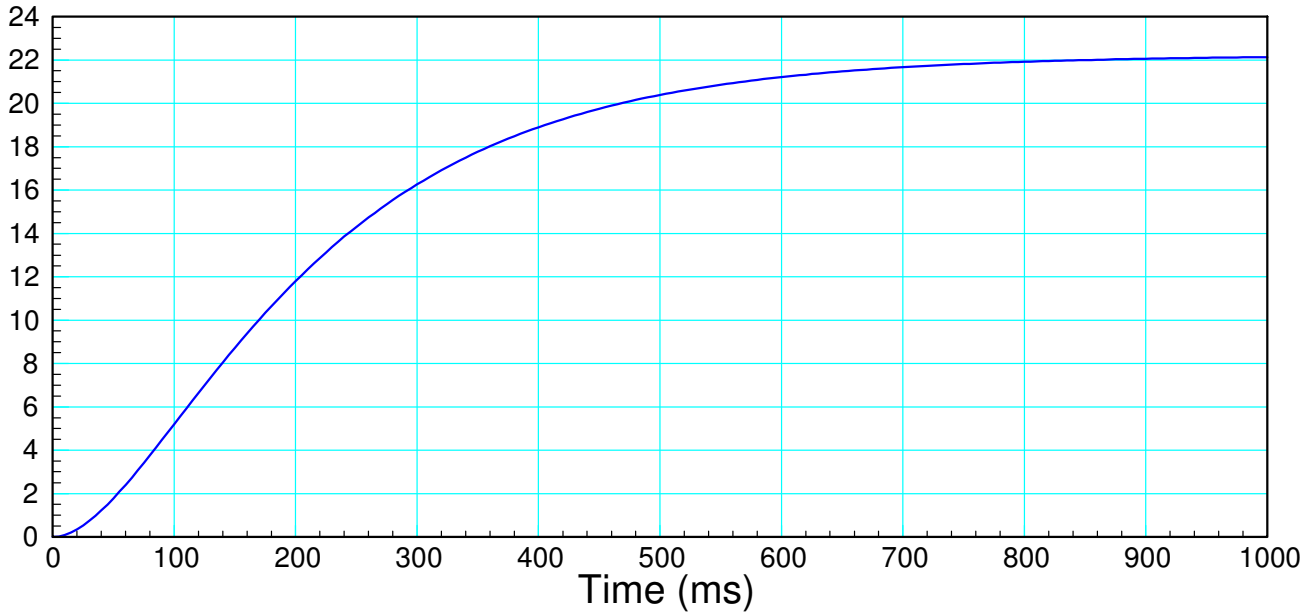


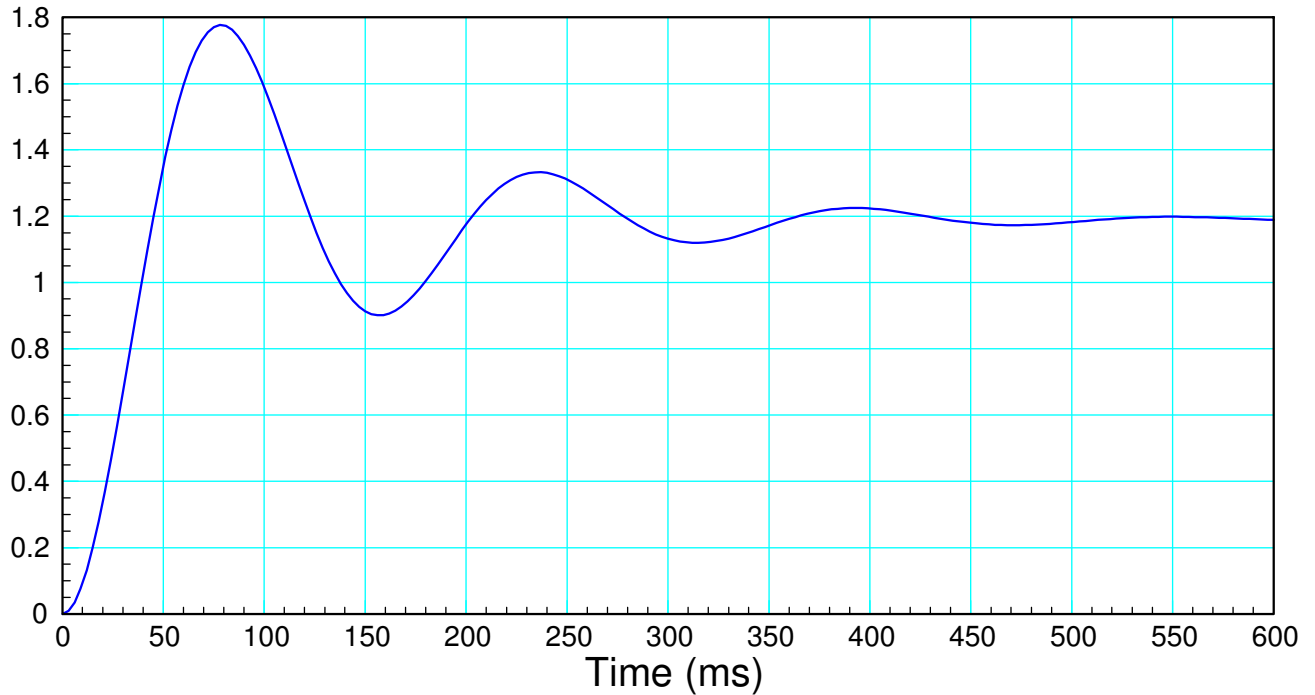
# ECE 463/663 - Homework #1

LaPlace Transforms and Dominant Poles. Due Wednesday, Jan 22nd

1) Name That System! Give the transfer function for a system with the following step response.



2) Name That System! Give the transfer function for a system with the following step response.



Problem 3 - 6) Assume

$$Y = \left( \frac{200}{(s+1.5)(s+5)(s+7)} \right) X$$

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

4) Determine  $y(t)$  assuming  $x(t)$  is a sinusoidal input:

$$x(t) = 3 \cos(2t) + 7 \sin(2t)$$

5) Determine  $y(t)$  assuming  $x(t)$  is a step input:

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

6a) Determine a 1st-order approximation for this system

$$Y = \left( \frac{200}{(s+1.5)(s+5)(s+7)} \right) X \approx \left( \frac{a}{s+b} \right) X$$

6b) Compare the step response of your 1st-order model to the actual 3rd-order system