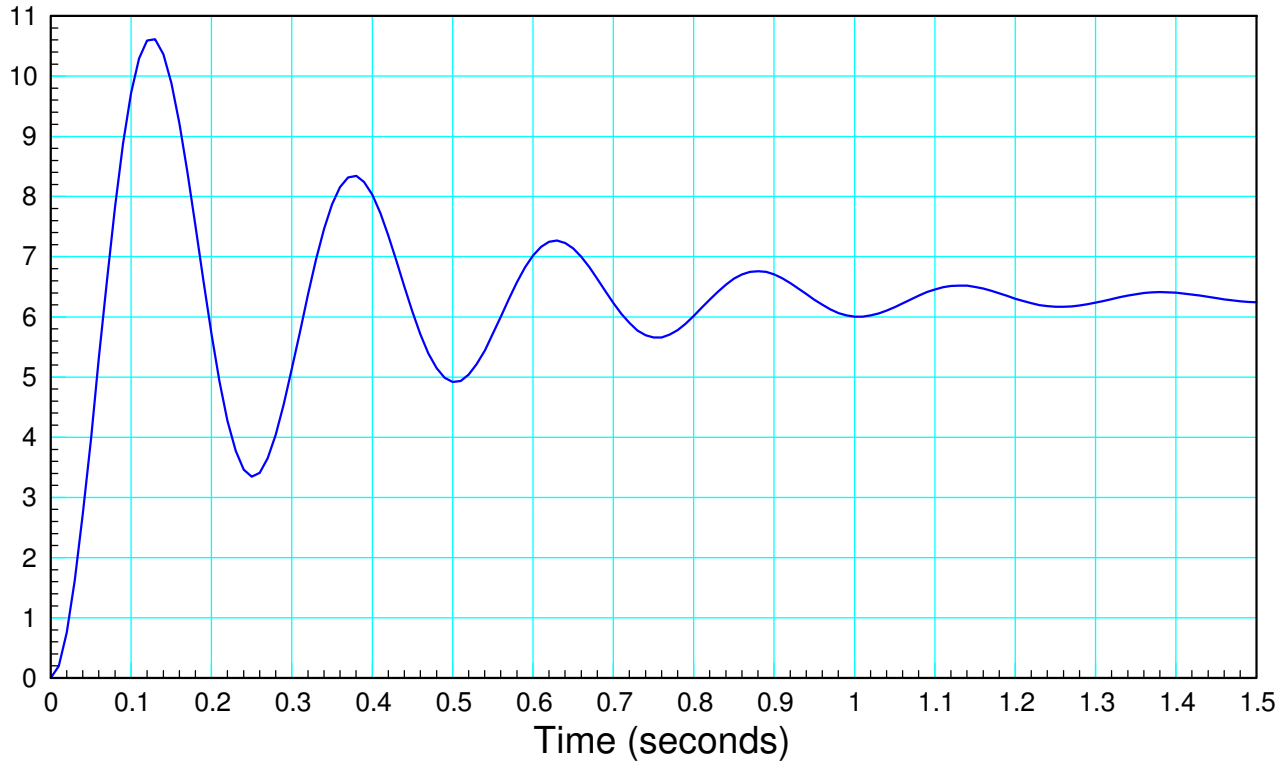
ECE 463/663: Test #1. Name _____

Spring 2025. Calculators allowed. Individual Effort

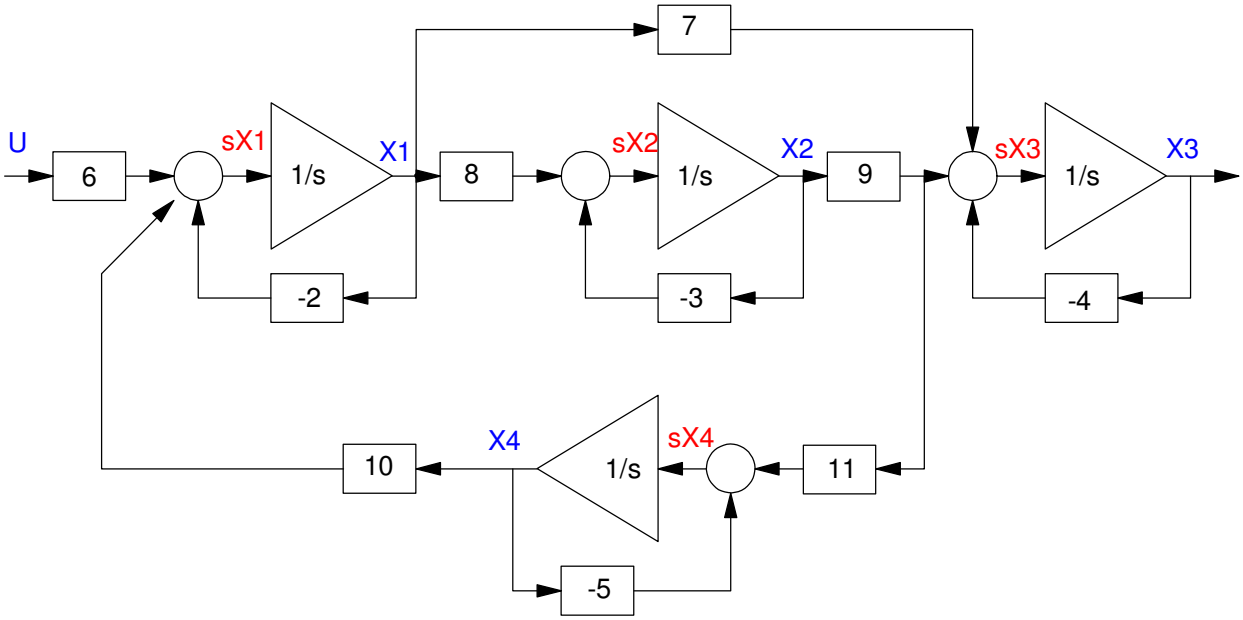
1) Find the transfer funciton for a system with the following step response

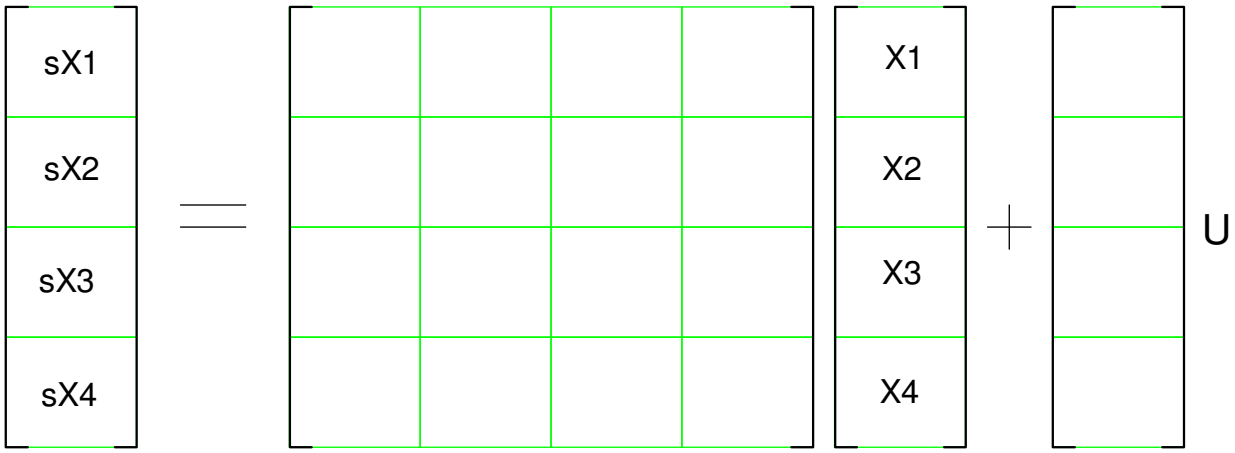


2) Determine a 2nd-order system which has approximately the same step response as the following system

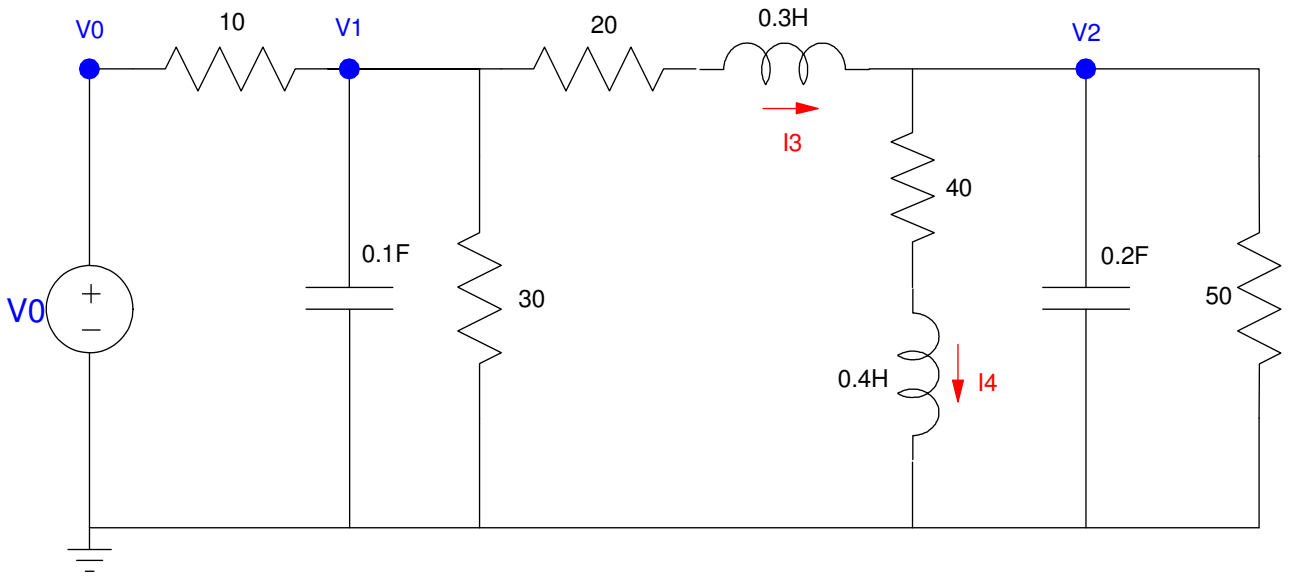
$$Y = \left(\frac{500(s+5)(s+6)(s+40)}{(s+2)(s+4)(s+30)(s+45)(s+50)} \right) X$$

3) Give {A and B} for the the state-space model for the following system





4) Write four coupled differential equations to describe the following circuit. Assume the states are {V1, V2, I3, I4}. Note: For capacitors: $I = C\frac{dV}{dt}$, For inductors: $V = L\frac{dI}{dt}$



5) Assume the LaGrangian is:

$$L = 3\sin(x)\dot{x} + 4x^2\cos(x) + 7\dot{x}^2\dot{\theta}^3$$

Determine

$$F = \frac{d}{dt}\left(\frac{\partial L}{\partial \dot{x}}\right) - \left(\frac{\partial L}{\partial x}\right)$$