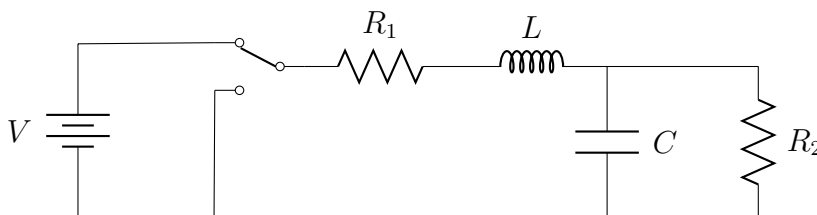


Instructions: This is an open-book, open-notes exam. Laptops may be used for access to reference material only. You have exactly 50 minutes to complete the exam. Be as neat as possible. Use the space provided and attach additional sheets as necessary (provided by proctor). There are five questions weighted equally.

1. For the following circuit, assuming the switch moves at time $t = 0$,



- determine the appropriate initial condition for each energy storage element, and
 - determine the differential equation describing the system for $t \geq 0$ treating the capacitor voltage as the output.
2. For a system described by the following differential equation

$$y'' + 6y' + 34y = 5x$$

where $y(0^-) = 2$ and $y'(0^-) = 0$,

- determine the zero-input response, and
 - determine the impulse response.
 - determine the Lyapunov (Asymptotic/Internal) stability of the associated system
3. For a system whose impulse response is given by

$$h(t) = 2(e^{-t} + e^{-3t})u(t)$$

determine the zero-state response for $x(t) = 2e^{-3t+6}u(t-2)$.

4. Determine if the system in the previous problem is BIBO stable.
5. Given two systems whose impulse responses are

$$h_1(t) = e^{-t}u(t)$$

and

$$h_2(t) = te^{-2t}u(t)$$

respectively, determine the overall impulse response of the systems connected in **series**.