

**Note: Please e-mail me your scanned HW to [Walcott@engr.uky.edu](mailto:Walcott@engr.uky.edu) with the subject: EE571 HW #1. All HW's and Solutions are on the web at <http://www.engr.uky.edu/csl/ee571>**

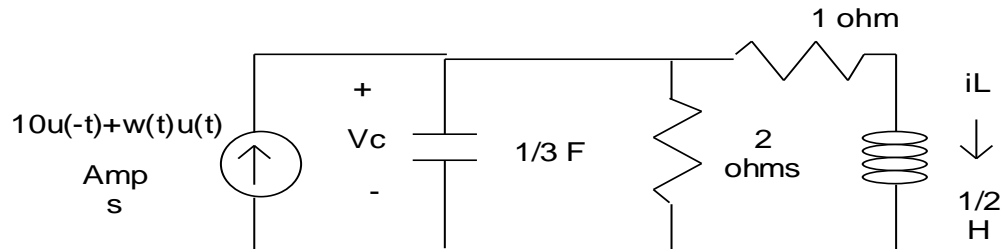
Due Monday, August 29

EE571

HW#1

Our HW Theme is: The State Variable Model and You

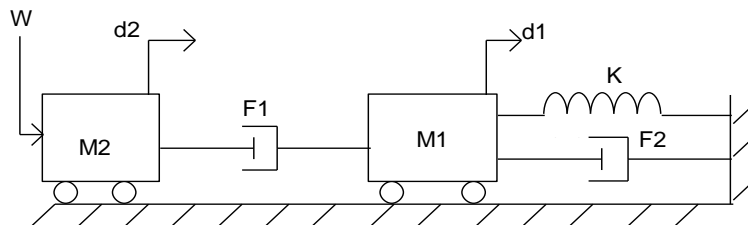
1. a) Find the state variable model of the form  $\dot{x} = Ax + Bw$ ,  $x(0^+)$  for the following electrical network:



(Hint: Let  $x = \begin{bmatrix} v_C \\ i_L \end{bmatrix}$ ) ((make sure to include your initial conditions))

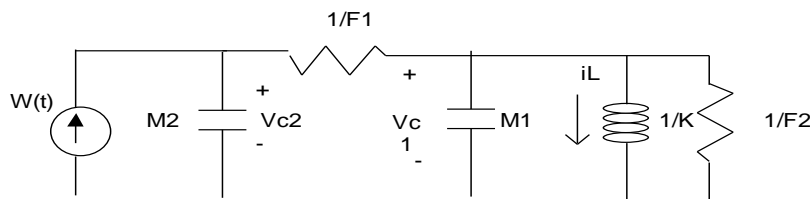
- b) English 101 Essay question: Briefly compare and contrast open-loop control versus closed-loop control. This course will mainly focus on closed-loop control

- 2a) Write the state variable model for the following mechanical circuit



(Hint: Let  $x = [\dot{d}_1 \quad \dot{d}_2 \quad K(d_1)]^T$  where T means transpose)

- b) Now write the state variable model for the following electrical circuit



(Hint: let  $x = [V_{C1} \quad V_{C2} \quad i_L]^T$ )

- c) Do you see any similarities between your answers for part 2a) and 2b)? These two systems are called *analogous circuits* or *analogous systems*. We will learn how to systematically find analogous electrical circuits for mechanical systems next lecture. Stay tuned!!!