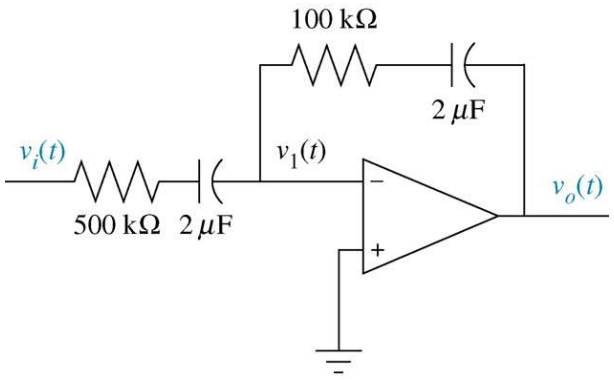
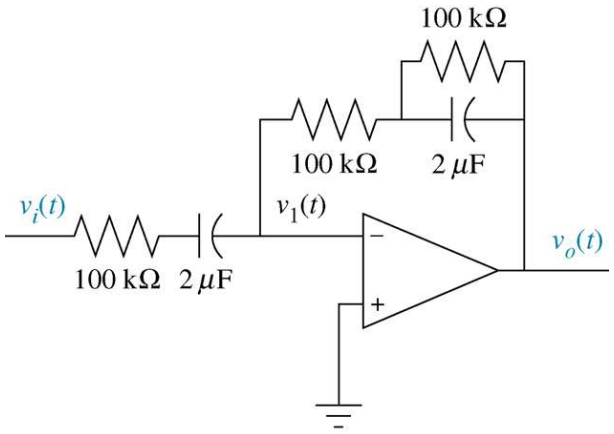
Homework 2

Note: Each part of each problem is worth 3 points and the homework is worth a total of 18 points.

1. Transfer Functions of Electrical Networks with Operational Amplifiers
   Find the transfer function, $G(s) = V_o(s)/V_i(s)$, for each operational amplifier circuit shown in the Figures below.

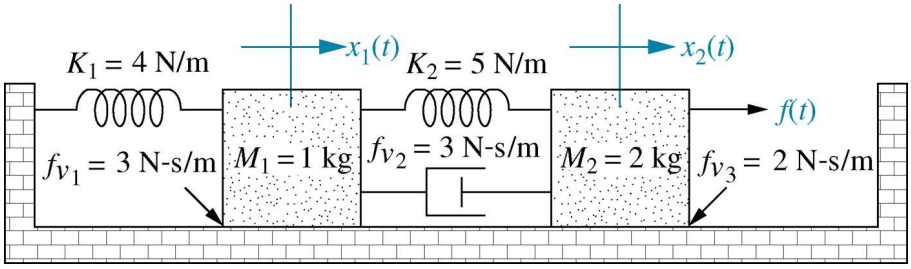


(a)



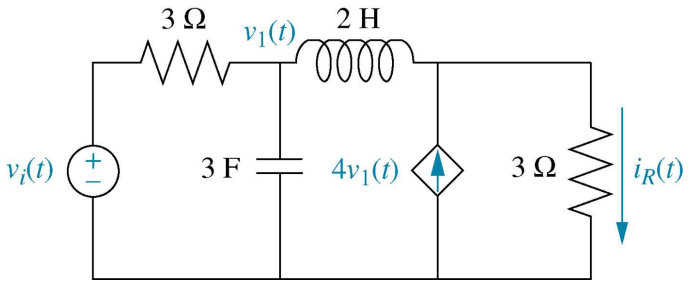
(b)

2. Transfer Functions of Translational Mechanical Systems
   For the system shown below, find the transfer function, $G(s) = X_1(s)/F(s)$.

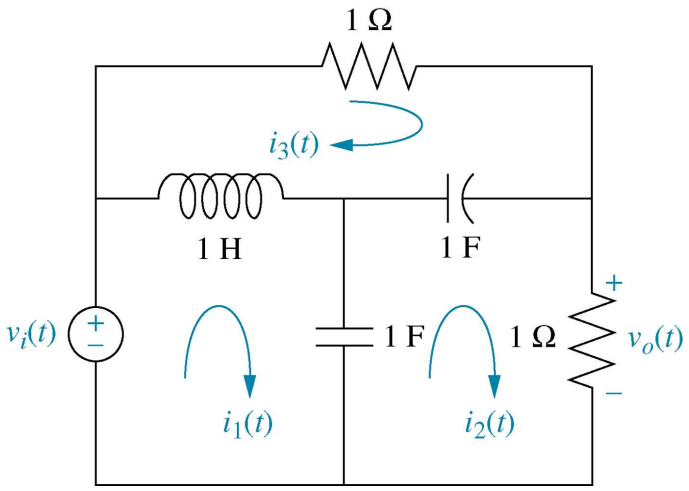


3. State Space Representation of Electrical Networks

(a) Represent the electrical network shown below in state space, where $i_R(t)$ is the output.



(b) Find the state space representation of the network shown below if the output is $v_o(t)$.



4. Transfer Function to Phase Variable Representation

For the system shown below, write the state equations and the output equation for the phase-variable representation.