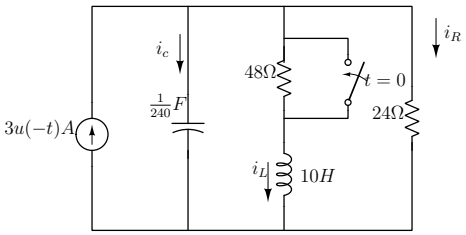
**EE2015 Electric Circuits and Networks - Tutorial 6**

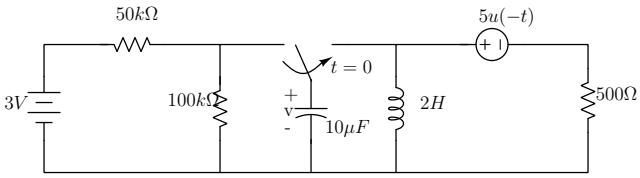
Sept. $20^{th}$, 2024

1. All plots must be roughly to scale
2. Key x and y axis values must be marked
3. Time constant must be shown

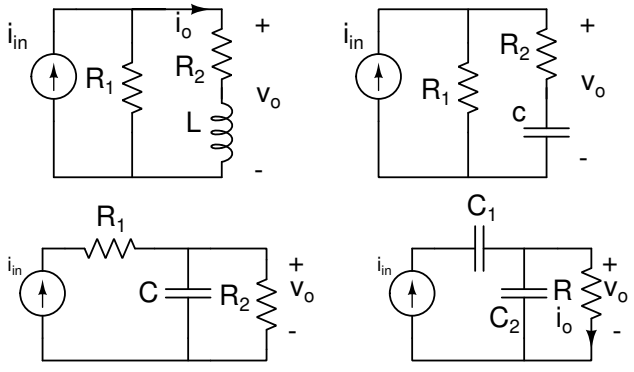
1. After being open for a long time, the switch in the network closes at $t = 0$. Find (a) $i_L(o^-)$ (b) $v_C(0^-)$ (c) $i_R(0^+)$ (d)$i_C(0^+)$

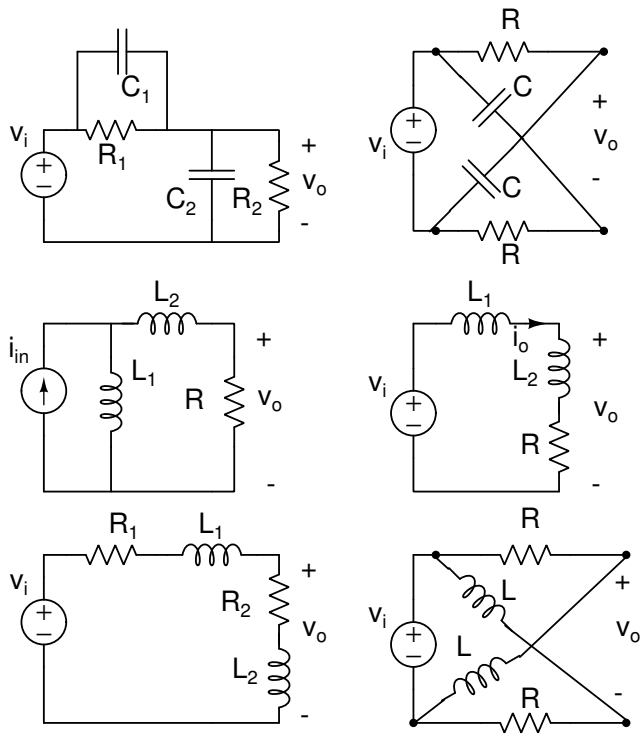



2. The switch is in the left position for a long time and is moved to the right at $t = 0$. Find $\frac{dv}{dt}$ at $t = 0^+$




3. Evaluate and sketch the step response for the following all of the ten circuits using time domain techniques. Write the differential equation for each of the outputs shown in the figure and find the (a) Zero state and zero input response and (b) natural and forced response. Initial conditions are zero.



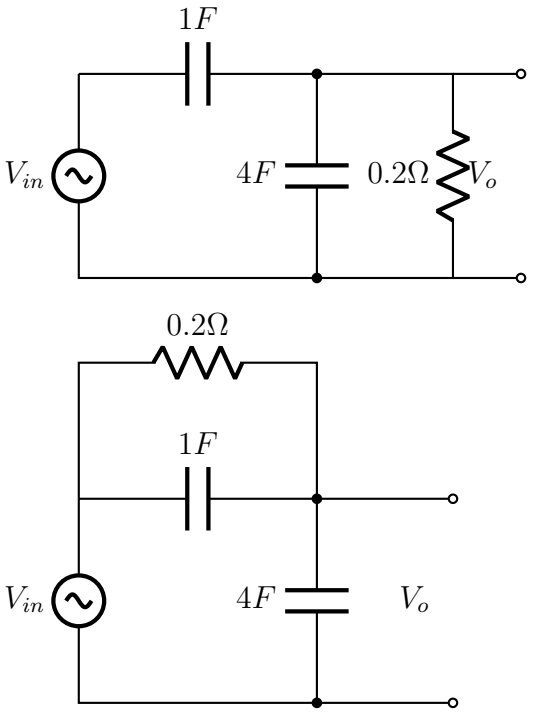

4. (a) For each of the ten circuits, find the impulse response by differentiating the step response

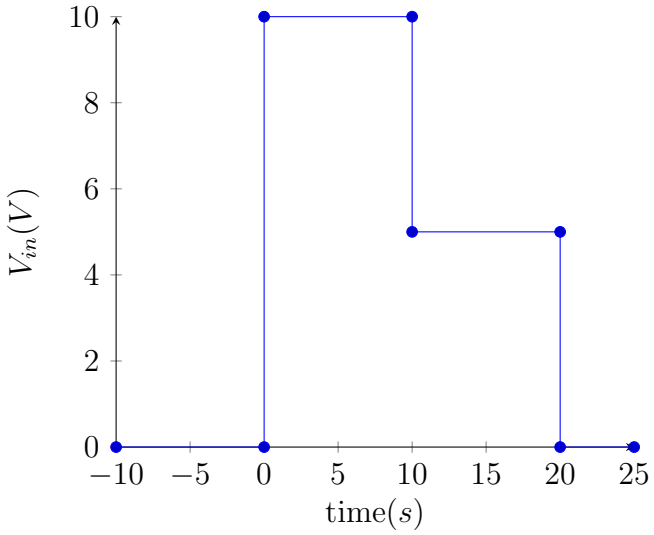
   (b) Verify your answer by finding the inverse Laplace transform of the transfer function.

   (c) In each circuit, find the poles and zeros and plot it in the complex frequency plane.

5. In the above questions find the steady state response by open circuiting the capacitor/short circuiting inductors. How are the values obtained related to the $v_o(t)$ and $i_o(t)$ you calculated earlier.

6. A pulse with the following amplitude is applied to the two circuits given below at $V_{in}$. Find and plot $V_o$.


1F
$V_{in}$
4F
0.2Ω
$V_o$
0.2Ω
1F
$V_{in}$
4F
$V_o$


10
8
6
4
2
0
$V_{in}(V)$
−10
−5
0
5
10
15
20
25
time$(s)$