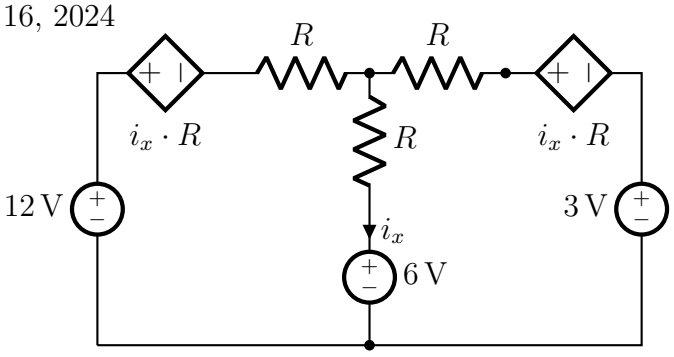
# EE2015: Electric Circuits and Networks

Tutorial 2

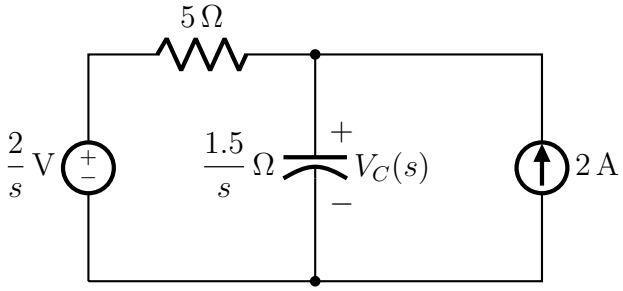
(s-domain representation, nodal and mesh analysis)

August 16, 2024

1. In the circuit shown on the right, determine the power *delivered* by the 6 V source when $R = 10\,\text{k}\Omega$.




2.



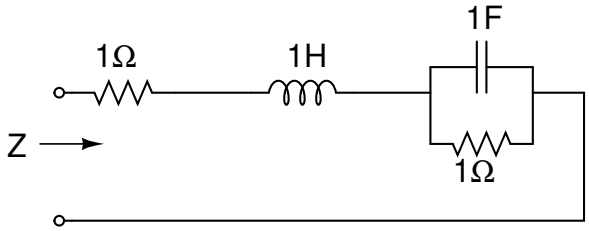

Consider the circuit shown on the left.

(a) Calculate $V_C(s)$.

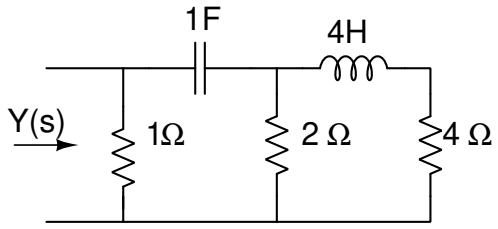
(b) Determine $v_C(t)$ for $t \geq 0$.

(c) Draw the time-domain representation of the circuit.

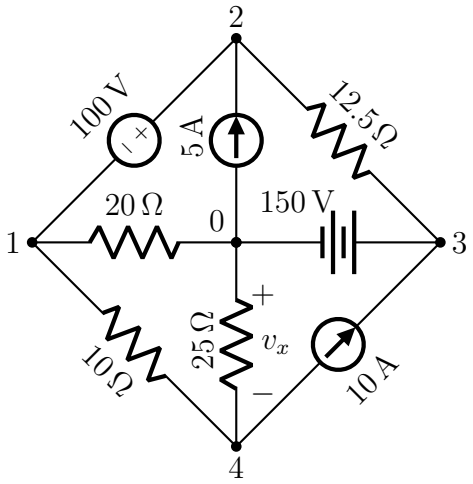
3. Find Z(s).




4. Find Y(s)

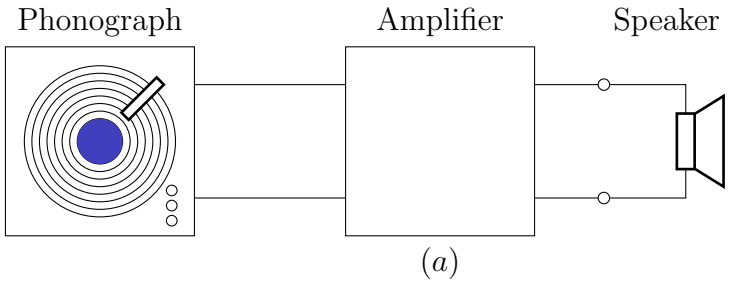


5.

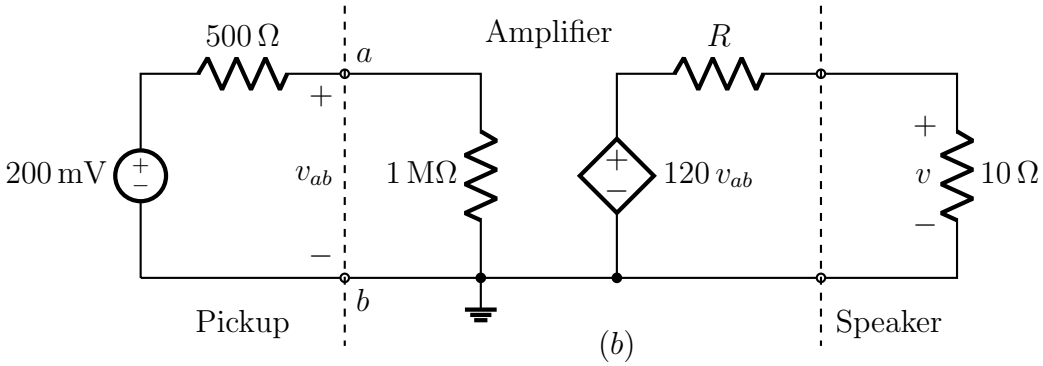



Consider the circuit shown on the left. Set up the equations for nodal analysis in matrix form and solve for the node voltages. Determine $v_x$. Treat node 0 as the reference node.

6. A phonograph pickup, stereo amplifier, and speaker are connected in series, as show below. Also shown is its equivalent circuit. Determine the resistance $R$ so that the voltage $v$ across the speaker is 16 V. What is the power delivered to the speaker?



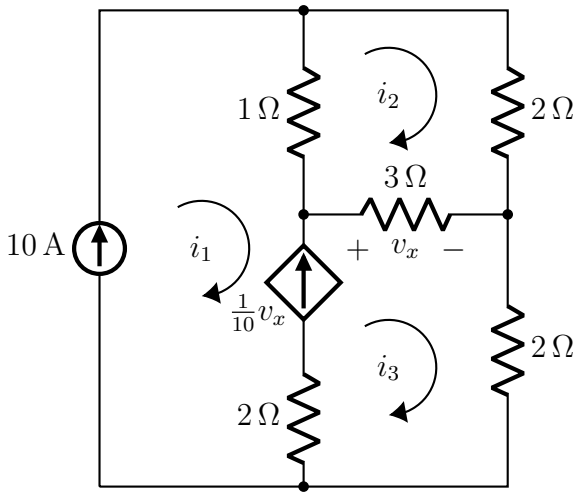

$(a)$




$(b)$

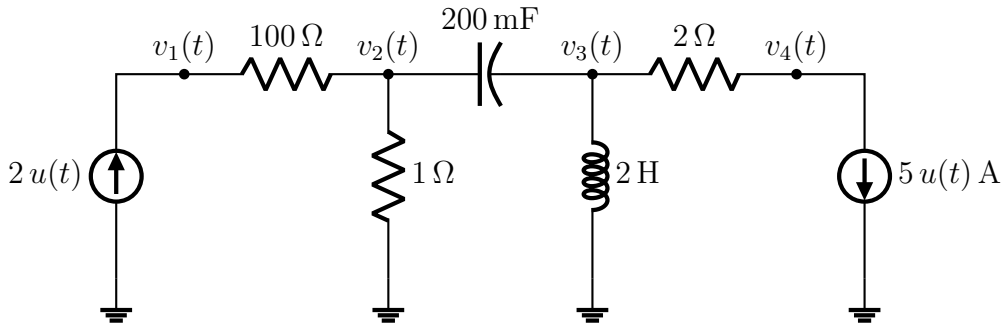
7.

For the circuit shown on the right, evaluate the unknown currents.




8. For the circuit given below, use nodal analysis in the $s$-domain to determine the voltages $v_2(t)$, and $v_3(t)$ for $t \geq 0$. No energy is stored in the circuit at $t = 0^-$. First write the nodal analysis matrix and obtain the solution in the $s$-domain. Then use the inverse Laplace transform to obtain the time-domain solutions.

   Verify your answers by using the loop analysis method.




9. For the circuit below, draw the corresponding s-domain circuit and determine $v_1(t), v_2(t)$ and $v_3(t)$.