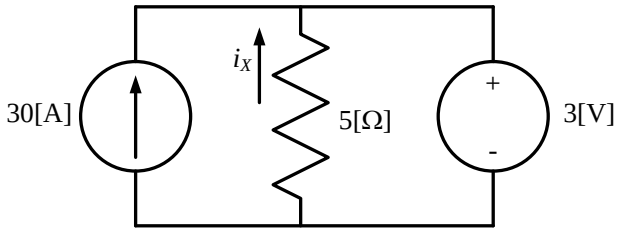
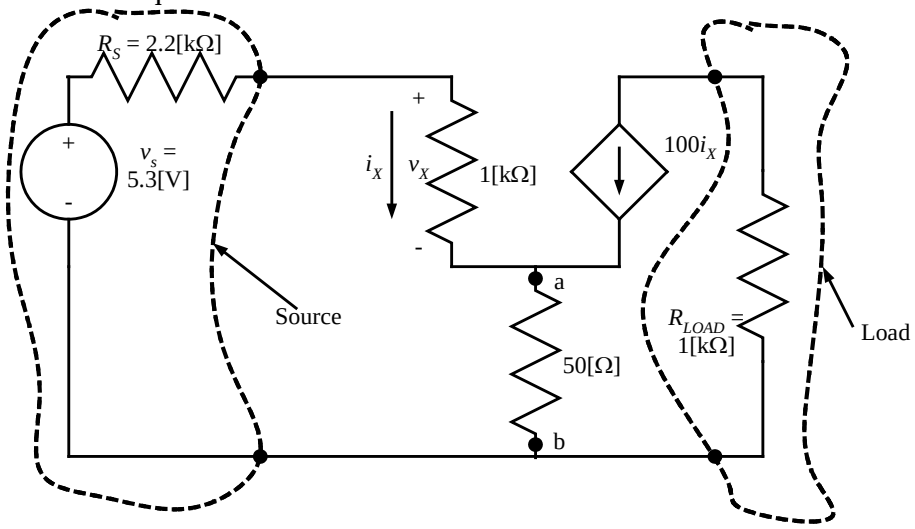
ECE 3355 – ELECTRONICS
HOMEWORK #1

1. Find the current i_X in the circuit below.



2. Find the Thévenin equivalent resistance seen at terminals a and b in the circuit below.

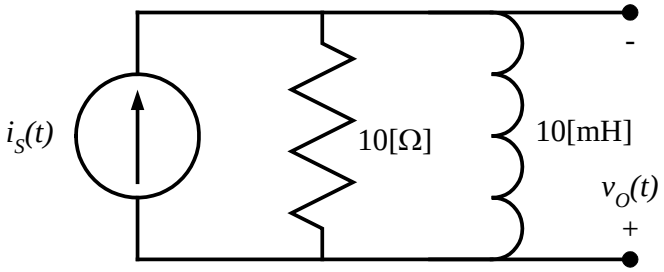


3. A student goes into an electronics laboratory with his CD player, and makes the following measurements. He removes the headphones, and in their place he connects a resistance substitution box. He inserts a test CD that provides a constant amplitude sinusoid at 1[kHz]. The table below shows the output voltages he measures for each of several different resistance values. What is the Thévenin resistance of the CD player, as seen by the headphones, at 1[kHz]?

Resistance, [Ω]	Measured Voltage, [V_{pp}]
5	0.78
8	1.11
11	1.42
16	1.77
22	2.13
27	2.35
33	2.56

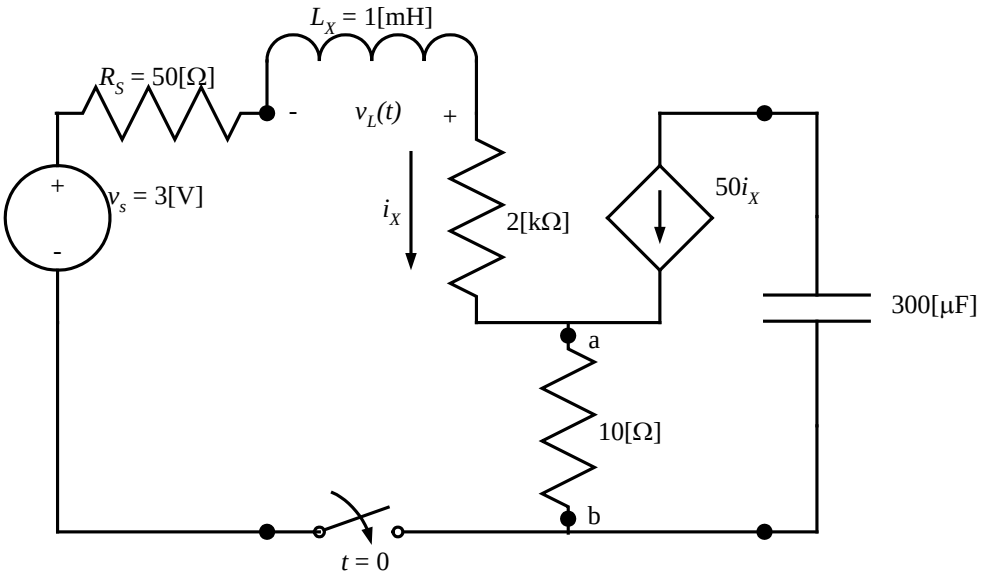
4. In the circuit below, $i_S(t) = 25\sin(\omega_0 t) - \frac{25}{9}\sin(3\omega_0 t) + 1\sin(5\omega_0 t)$ [mA], where $\omega_0 = 100\ \pi$[rad/s].

   a) Find the steady state value of $v_O(t)$.



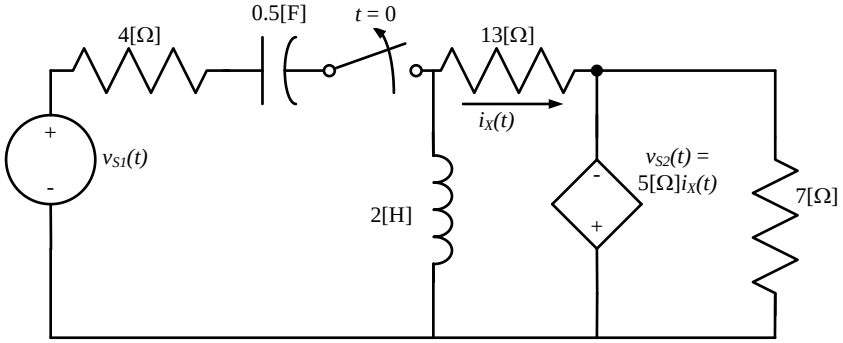
   b) Using any source you choose, find the Fourier series for a triangle wave (the internet is a good place to start). Write down the first three terms in the series. What relation do these terms have to the current source $i_s(t)$ in the circuit above? What does that tell you about the waveform produced by the current source?
   c) Using any mathematics package you choose, plot the waveform $i_S(t)$ for at least two periods. Does it look like what you expected?

5. In the circuit below, the switch closed at $t = 0$. Find $v_L(t)$ for $t > 0$.



6. For the circuit shown, the switch had been closed for a long time before opening at $t = 0$. Find $i_X(0.4[\text{s}])$.

$$v_{S1}(t) = 16[\text{V}]\cos\left(3\left[\frac{\text{rad}}{\text{s}}\right]t + 168°\right).$$



7. Send an e-mail to your instructor that answers the following questions. In the subject line of your email, put your name, and "HW Set #1".

a) What is your name?

b) What have you heard about ECE 3355?

c) At which college/university did you take ECE 2300/2201/2202 (Circuit Analysis)?

d) How many hours per week do you plan to spend on homework, reading the text or notes, and other studying related to ECE 3355?

e) Do you have any comments? If so, what are they?

ECE 3355
Homework Submission Instructions

The following are instructions for turning in homework assignments. These instructions will hold for all homework assignments in this course.

1) Use 8.5” by 11” paper.
2) Staple the pages together at the upper left.
3) After completing your homework assignment, fold the paper(s) in half, length-wise.
4) Once folded, place the folded paper(s) down on a flat surface with the paper “crease” on the left.
5) Once paper crease is on the left, use the “upper third” of the of outer-most sheet to write in order the following:
    i. Your name
    ii. ECE 3355
    iii. Section #
    iv. Homework assignment number
    v. Due date of homework assignment

Failure to follow the above instructions will result in a reduction of the grade for the homework assignment in question.

Homework turned in after the due date and time will receive a grade of zero (0).