ECE 3355 – ELECTRONICS

HOMEWORK #1

1. Find the current *iX* in the circuit below.



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



1. 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, [] | Measured Voltage, [Vpp] |
| 5 | 0.78 |
| 8 | 1.11 |
| 11 | 1.42 |
| 16 | 1.77 |
| 22 | 2.13 |
| 27 | 2.35 |
| 33 | 2.56 |

1. In the circuit below, , where 0 = 100  [rad/s].
2. Find the steady state value of vO(t).



1. 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 is(t) in the circuit above? What does that tell you about the waveform produced by the current source?
2. Using any mathematics package you choose, plot the waveform iS(t) for at least a couple of periods. Does it look like what you expected?
3. In the circuit below, the switch closed at *t* = 0. Find *vL(t)* for *t* > 0.



6. For the circuit shown, the switch had been closed for a long time before opening at *t* = 0. Find *iX*(0.4[s]).





**LTSPICE**

Some of the later homework assignments will include simulations performed using the circuit simulation package LTSpice. Go to the *Trombetta Homework* folder and look in the folder *LTSpice Tutorials*. Those documents should be self-explanatory. Look through there and download the LTSpice application to your computer. Explore it a bit – we’ll use it a little later.

If you’re a Mac user, hey, I’m with you - I have one too. But LTSpice gave me a lot of trouble on my Mac and I eventually gave up and loaded it onto the pc in my office. You may be able to get yours to work…

# Selected Numerical Answers

# 2) Rth = 19.4 

# 4a) vo(t) = 74.94 sin(ot+72.6o) - 19.05 sin(ot+46.7o)+8.44 sin(ot+32.5o) mV

# 5) vL(t) = -3 exp(-2,560,000 t) V, t > 0 s

# 6) 96.3 mA**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 “middle third” of the of outer-most sheet to write in order the following:
	* 1. Your name
		2. ECE 3455
		3. Section #
		4. Homework assignment number
		5. 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).