

6.002 Demo #02 (Load set up Demo#02.set)
KVL & KCL
Lecture 2

Agarwal Fall 00

Purpose:

This demo provides an example for KVL by measuring the voltages across components in a loop, and KCL by measuring the currents into a node. Nodal analysis is also compared with this example, by comparing measured values with calculated values. The circuit used is five resistors in a bridge topology, with an AC and a DC voltage source. The AC source is used for KCL, along with a field-sensing current meter. The DC source is used with a multimeter for the comparison with calculated values.

Steps:

1. To show KVL, measure voltages around a loop and show that they sum to 0.
2. To show KCL, measure currents into a node and show that they sum to 0. Additionally, take the three loose wires (see figure), bunch them together, and use the field-sensing meter to show the current is 0 when all three wires are put into the ring together.

Note: this demo should be performed in conjunction with a blackboard analysis of nodal analysis using the same circuit as the demo.

Description: Nodal analysis

Showing KVL and KCL Using bridge Resistor with 3 long wires on it and a brown bag to cover the wires! (Done by Prof. Agarwal).

For KVL, FG1 should be set at VDC 3 V offset, DC only.

For KCL, FG1 should be set at 3 V p-p sine wave, freq. 1kHz, and 0V offset.

We use digital meter (my meter) to show KVL instead of scope.

For the KCL we use an old current meter and set ch4 @ 10 mV/div (set meter at 1 mAmp “ not 1 Amp range”. Clamp on each wire one at the time to show individual current and later all three wires together to show that the sum of all currents will be zero.

NOTE: To show KVL set offset @ 3 v p-p which correspond to 3 v p-p because of the internal Hi Z Ohm termination.

Oscilloscope Setup

CH	V/DIV	OFFSET	MODE	FUNC	MATH	VERTICAL	HORIZONTAL
1	off						
2	off						
3	off						
4	on	10 mV/div	0		off		

Cite as: Anant Agarwal and Jeffrey Lang, course materials for 6.002 Circuits and Electronics, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].

Horizontal: 500 uS

Acquisition: AUTO AUTO 4

Trigger: CH1

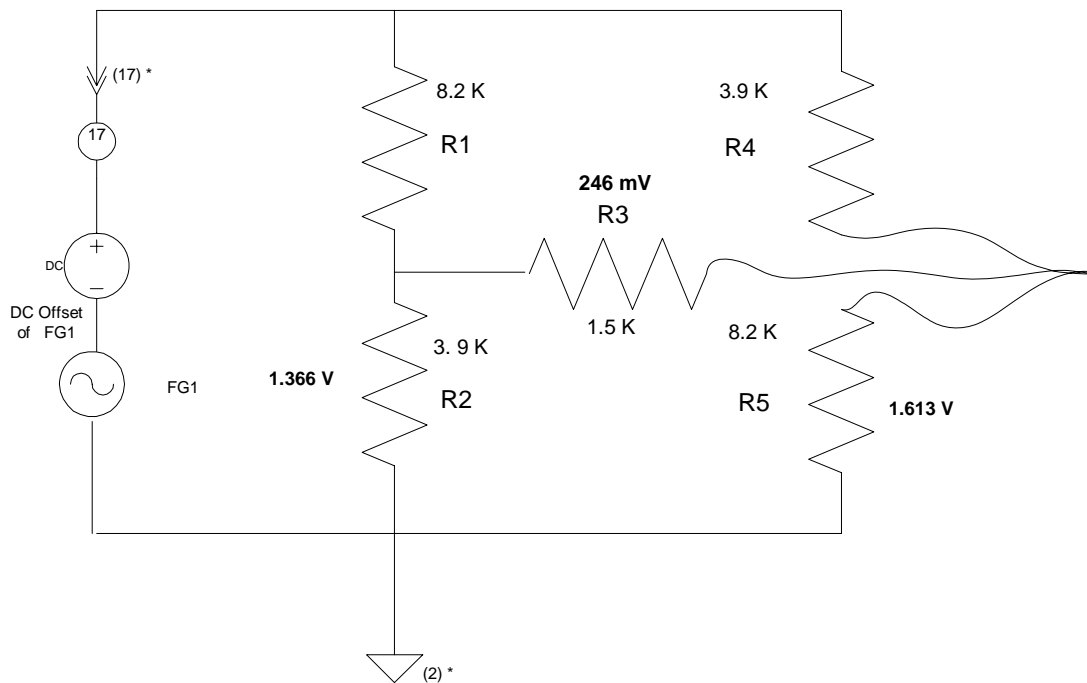
Waveform Generator Setup

Power Supply Setup

UNIT	WAVE	AMP	OFFSET	FREQ	+6	+25	-25	OUTPUT
FG1	SIN	0V	3 V	DC Only	Hi Z			NOTE: FOR KVL
FG1	DCV	3V	0V	1kHz	HiZ			NOTE: FOR KCL

Trigger: INT

KVI & KCL
Nodal
Analysis



Note # of pins and BNC connectors