

CS 2420 Lab 1

Topics: Circuits and Introduction to NI Elvis Lab Instrument

Pre Lab.

Fill in the expected values for the two circuits below found in T2 and T3. Use equal values for all resistances for your calculations. Be able to show your work as you will need to be able to explain how you found these values in your report.

DO NOT CHANGE ANY SETTINGS ON SWITCHES AND KNOBS ON THE NI ELVIS, UNLESS TOLD TO DO SO.

ALWAYS TURN OFF BOARD POWER SWITCH when you want to change something on the board. ONLY TURN ON POWER TO THE BOARD after everything is settled on the board.

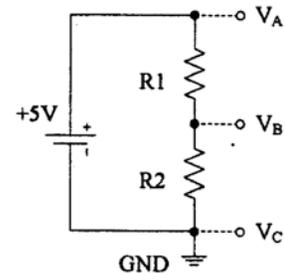
T1. Use NI Elvis as a voltmeter

Connect the red probe cable to the DMM (Digital Multimeter) V Ω connector on the left side of the control panel as well as the black probe cable to COM connector below the red probe. Start up the NI Elvis software by double clicking the NI ELVISmx icon from the start menu. Click on the “Digital Multimeter” cell (DMM). With the Multimeter Pop-Up select V=, mode: Specify Range and Range: 10V, which tells Elvis to be a voltmeter (for direct current circuits) and the maximum volt measurement, will be less than 10 volts.

By “touching” the various points on the prototyping board you will be able to measure voltage levels at different points in circuits. Test this by inserting a wire into the channel labeled “+5v+ as well as a wire into the channel labeled “Ground”. After this, turn on the boards power supply, and then click RUN on the DMM software. Use the red probe to “touch” the exposed end of the wire placed in the “+5v” channel with the black probe touching the exposed end of the other wire in the “Ground” channel. The DMM should be displaying a “+5v” reading.

T2. Measure a circuit

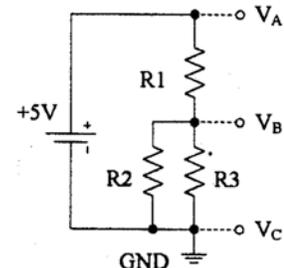
Set up two equal resistors (R1 and R2) in series (as shown in Fig. 1 to the right) as indicated by your instructor. If you are unsure if your resistors are equal ask your instructor. Connect one end of the circuit to the “+5v” channel and the other end to the “Ground” channel. Once your circuit is built, supply power to the board. Measure the circuit at 3 points: The +5v end (V_A), the **middle** (V_B) between the two resistors, and the **GND** end (V_C). Fill in the table below with the data you got from the different measuring locations. Finally, mark the current direction in the circuit.



Probing Points	V_A	V_B	V_C
Expected Voltage (V)			
Measured Voltage (V)			

T3. Measure a Circuit

Repeat the steps in T2 for a new circuit using three equal resistors as shown in Fig. 2 on the right. Now measure voltage at the three points again and fill in the table below with the data you retrieved. As before identify the direction of the current.



Probing Points	V_A	V_B	V_C
Expected Voltage (V)			
Measured Voltage (V)			

If still not sure how to reduce/solve circuits, ask your instructor for help

T4. Get Digital Signals from NI Elvis Software

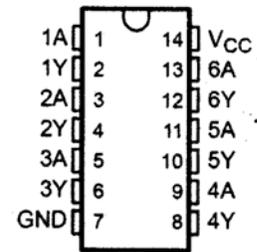
Find the channels labeled DIO 0 and DIO 1 on the upper right side of the board. Place a wire running from DIO 0 to the channel labeled LED 0 located on the bottom right side of the board. Run another wire from DIO 1 to LED 1. Make sure that there is some exposed wire so the probe can measure the voltage at either end of the wire. No click on the DigOut (Digital Writer) cell on the your NI Elvis instrument panel. Make sure the lines to write is 0-7 and the manual pattern is “lo, lo” for lines 0 and 1 respectively. (By selecting write lines 0-7 makes the channels 0-7 as output channels).

Click on the green “RUN” button. This puts a stable (continuous) 0v, 0v on the two channels labeled DIO 0 and DIO 1 respectively. You can tell because the corresponding LEDs 0 and 1 should still be off (not bright). You can verify by measuring the voltages with your voltmeter also. Use the Digital Writer to change the values of DIO 0 and DIO 1 as indicated below and record the LED and voltage outputs corresponding to the HI/LO manual patterns. Use the green Write button to make sure the voltages are updated on the DIO channels.

Manual DIO 1	Manual DIO 0	Voltage DIO 1	Voltage DIO 0	Voltage LED 1	Voltage LED 0
lo	lo				
lo	hi				
hi	lo				
hi	hi				

T5. Use chips with NI Elvis

Find the 7404 chip already on the board (ask instructor if can't find it or not sure). It has 6 inverters with the pin layout shown in Fig. 3 to the right. For example; 1Y = NOT 1A; 2Y = NOT 2A. Connect the pin Vcc to the “+5v” channel and the GND pin to the “Ground” channel using two wires. Supply power to the board and measure the two pins to make sure the chip is correctly powered.



Connect DIO 0 to the input pin 1A and the output pin 1Y to LED 7. This time also measure voltage levels for the input and output pins as you fill in the table below.

Input		Output		
Logic Input	Voltage at 1A	Voltage at 1Y	Logic Output	LED 7 (on/off)
0 (lo)				
1 (hi)				