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CIRCUITS AND ELECTRONICS LAB - ECE 312L

MyDAQ assignment 1

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# DESCRIPTION OF THE HARDWARE SETUP

## Circuit connections:

The purpose was to implement the circuit in the figure by using two NAND gates to generate 1 output from 3 different inputs according to a required logic expression.

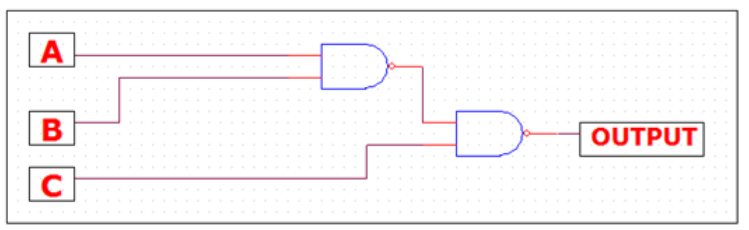


Figure 1 circuit diagram

According to the figure, A and B are connected to the input of the first NAND gate. Their output along with C are connected to another NAND gate which give the final output of the circuit.

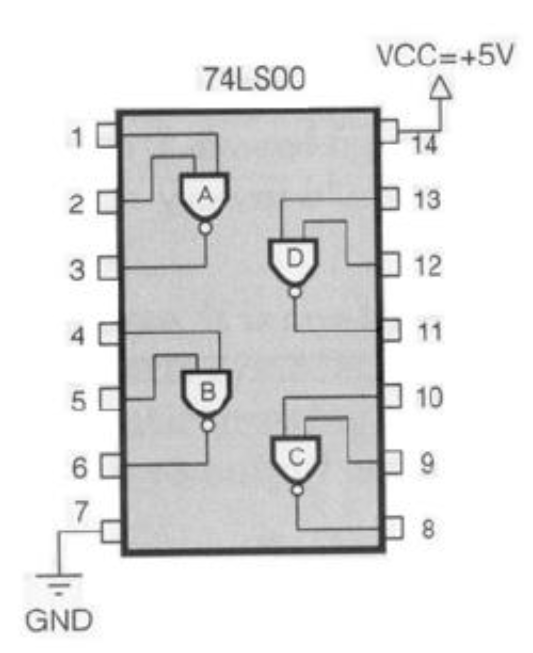


Figure 2 IC 74LS00 NAND chip

1. The IC 74LS00 (NAND chip) is placed on the breadboard. (figure 3)
2. 1 and 2 are the inputs of the NAND gate A.
3. Output of A and C are connected to the 9 and 10 inputs of the NAND gate C.
4. The output of C is the final output of the digital circuit.

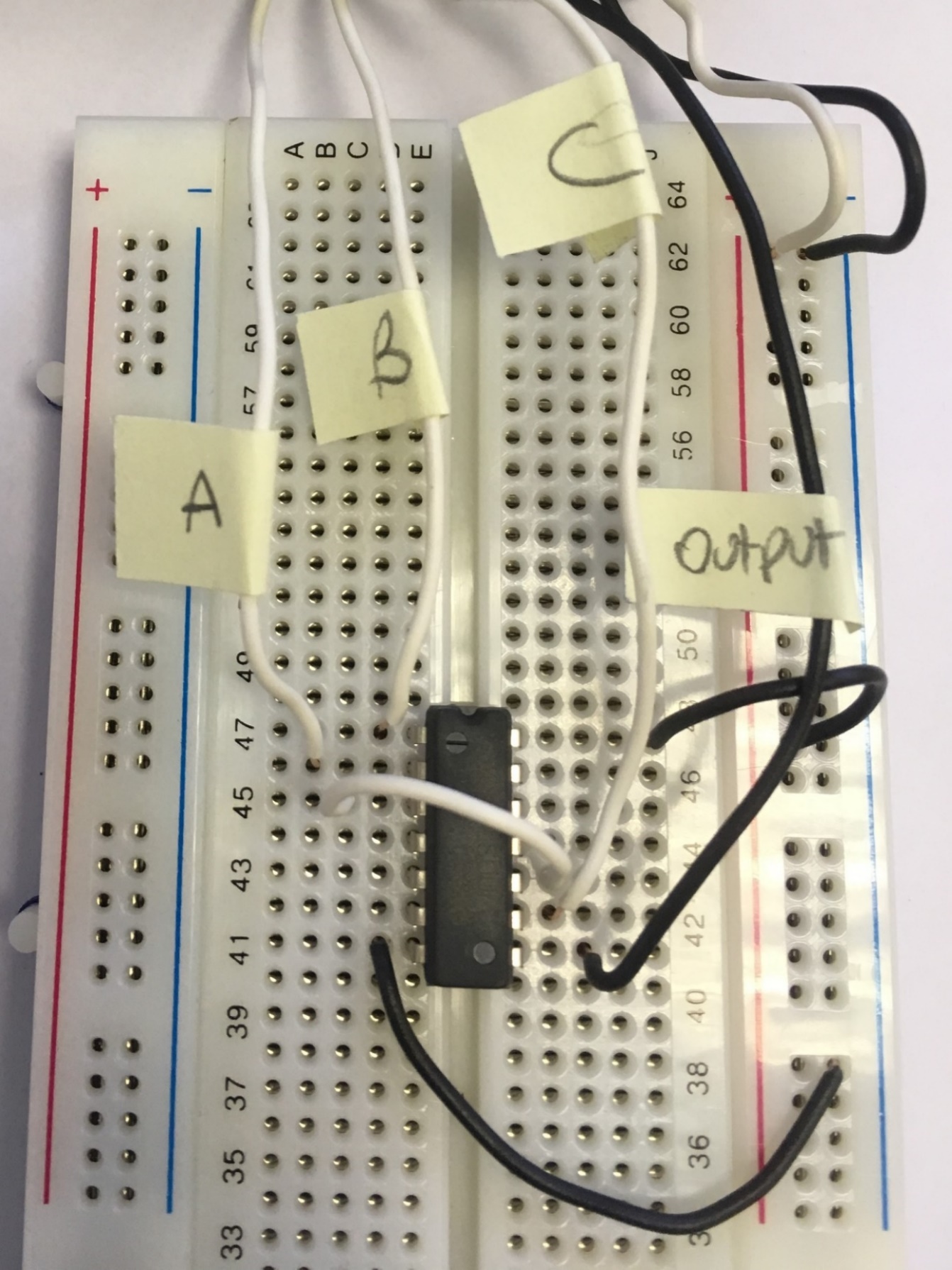


Figure 3 Circuit Connections

## Connections between MyDAQ acquisition board and the circuit:

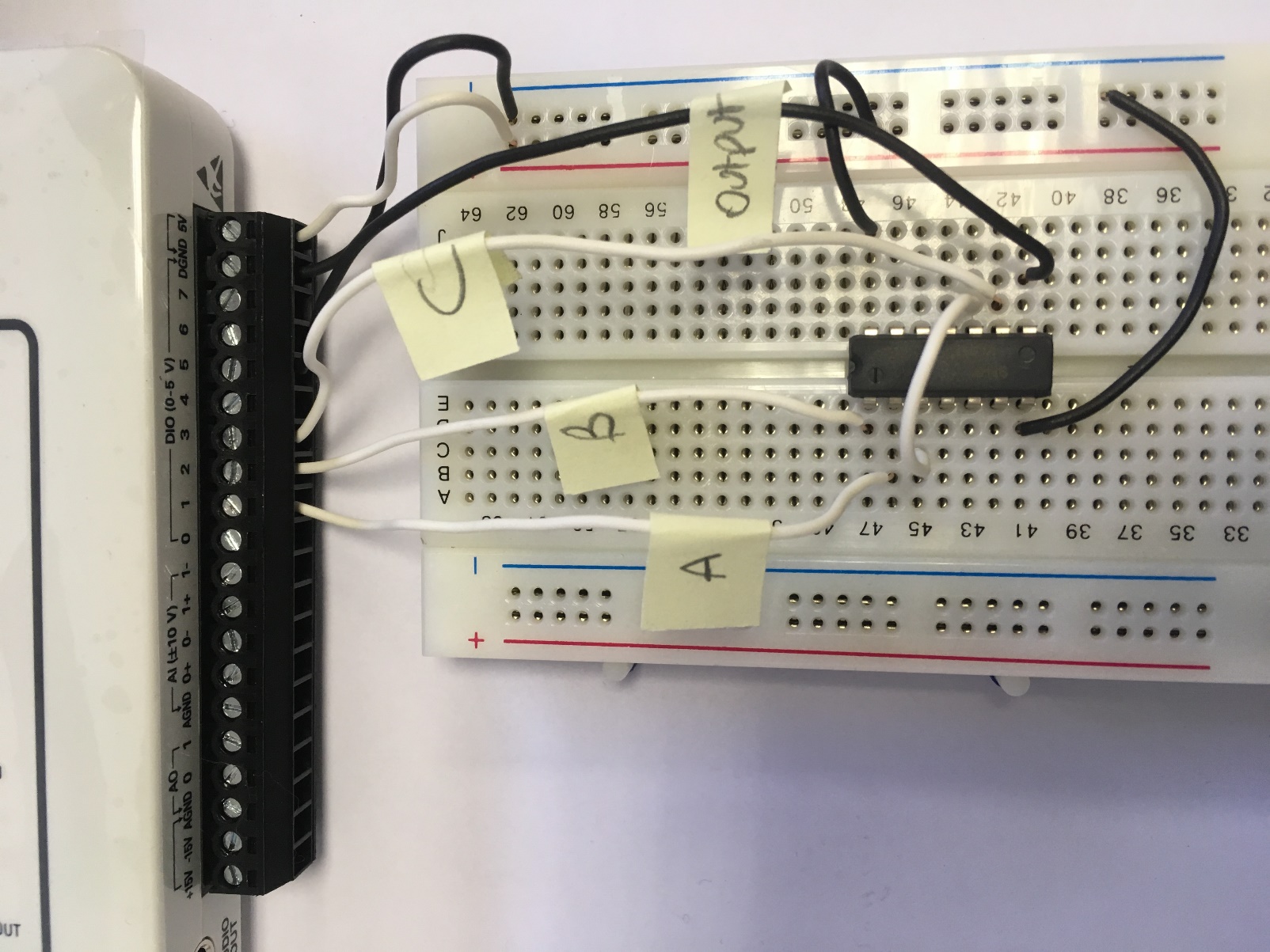


Figure 4 Connections between MyDAQ acquisition board and the circuit

## Input and output lines:

1. Connect pin 7 of the chip to the ground in the MyDAQ.
2. Connect pin 14 of the chip to the VCC 5 V of the MyDAQ.

*Lines 1,2, and 3 are used as digital outputs in the MyDAQ while line 5 is used as digital input.*

1. Connect digital output 1 of the MyDAQ to pin 2 of the chip.
2. Connect digital output 2 of the MyDAQ to pin 1 of the chip.
3. Connect digital output 3 of the MyDAQ to pin 9 of the chip.
4. Connect digital input 5 of the MyDAQ to pin 8 of the chip.

## Photo depicting hardware setup and connections:

Figure 5 Hardware setup and connections

# DESCRIPTION OF THE SOFTWARE SETUP

## Modules used and configurations:

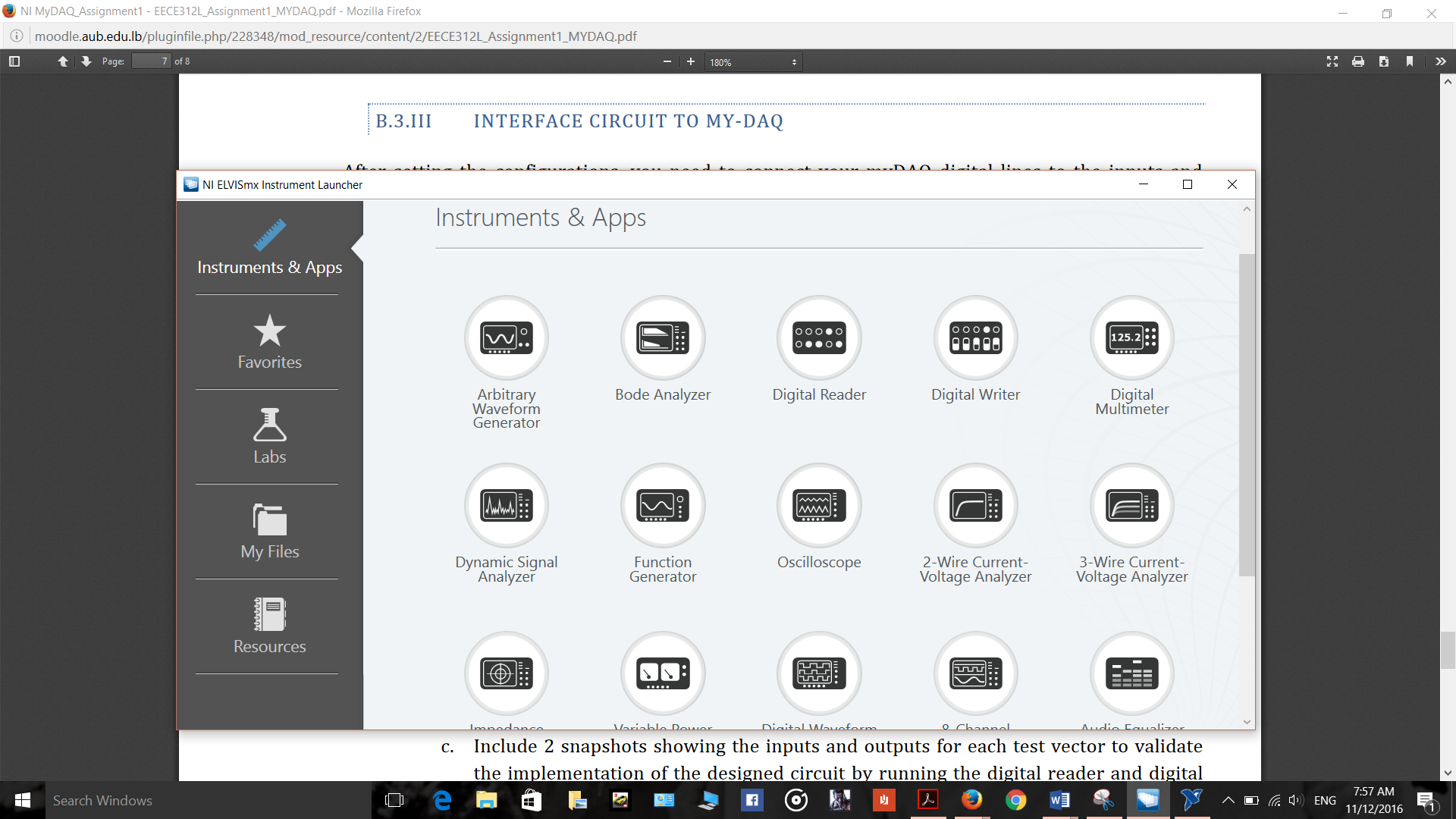
* Connect the MyDAQ to the PC, NI ELVISmx Instrument Launcher will start automatically:

Figure 6 NI ELVISmx Instrument Launcher

* Using the digital writer (figure 7), choose the lines (0-3) as digital outputs. Digital output lines of MyDAQ will be used as inputs to the circuit built on the breadboard

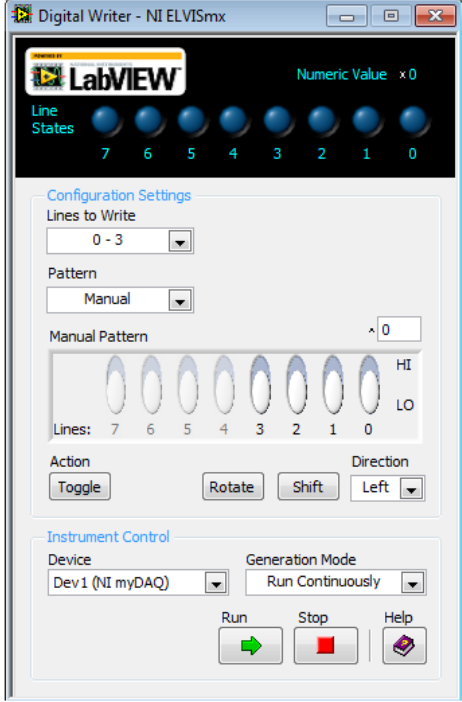


Figure 7 Digital Writer

* Using digital reader (figure 8), set the lines (4-7) as digital inputs. Digital input lines of MyDAQ will be used as outputs to the circuit built on the breadboard.



Figure 8 Digital Reader

# TESTING

## Select two different testing vectors.

A is chosen to be zero, so the two variable vectors are B and C.

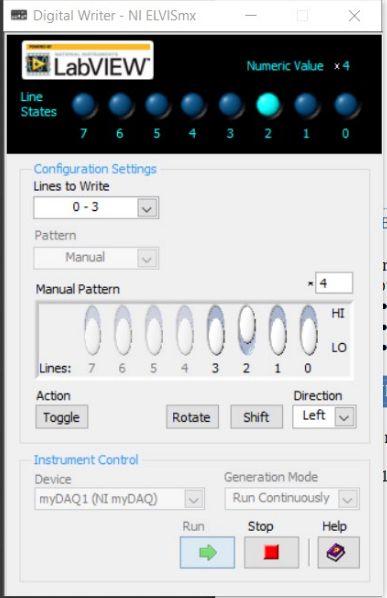
## Theoretical outputs of the chosen Test Vectors:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A | B | C | (AB) | (AB)’ | C(AB)’ | OUTPUT[[1]](#footnote-1) |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 |

Figure 9 Truth Table

## The two highlighted rows in the truth table are shown in the screenshots

* For the first shaded row:

Output, line 5 in this experiment, is one.

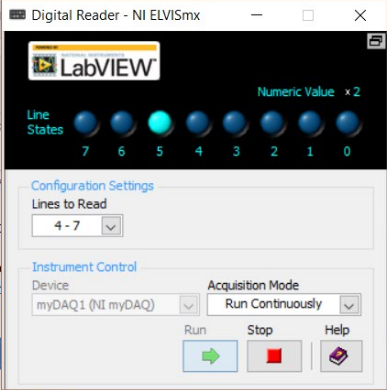


Figure 10 Digital Writer

Figure 11 Digital Reader

* For the second shaded row:

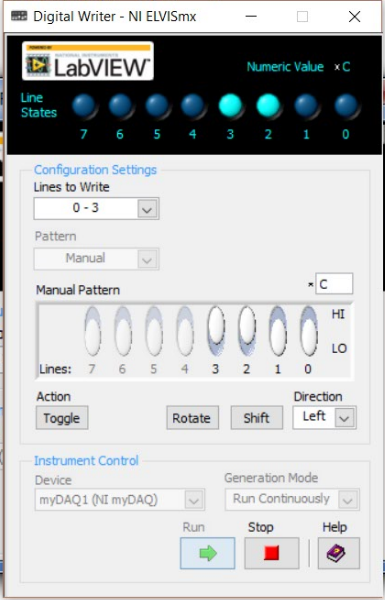
Output, line 5 in this experiment, is zero.

Figure 12 Digital Reader

Figure 13 Digital Writer

1. Output in this experiment is [C (AB)’]’ [↑](#footnote-ref-1)