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## Lab 03 - NAND Only Logic

In this lab, you've learned how to convert arbitrary logical equations into NAND only circuits, and why that might be a good thing.

### Rubric

Item	Description	Value
Summary Answers	Your writings about what you learned in this lab.	25%
Question 1	Your answers to the question	25%
Question 2	Your answers to the question	25%
Question 3	Your answers to the question	25%

### Lab Summary

We were able to learn the utility of NAND gates and also how to implement them in a circuit board.

# Lab Questions

1 - Write down DeMorgan's Law and the truth tables proving it out.

The image shows handwritten notes on a grid paper background. At the top left, it says "DeMorgan's Law". Below it, two equations are written:  $\overline{AB} = \overline{A} + \overline{B}$  and  $\overline{A+B} = \overline{A} \cdot \overline{B}$ . To the right of these equations is a truth table for DeMorgan's laws. The columns are labeled A, B,  $\overline{AB}$ ,  $\overline{A} + \overline{B}$ ,  $\overline{A+B}$ , and  $\overline{A} \cdot \overline{B}$ . The rows show all combinations of A and B: (0,0), (0,1), (1,0), and (1,1). The values in the table are as follows:

A	B	$\overline{AB}$	$\overline{A} + \overline{B}$	$\overline{A+B}$	$\overline{A} \cdot \overline{B}$
0	0	1	1	1	1
0	1	1	1	0	0
1	0	1	1	0	0
1	1	0	0	0	0

2 - What is the value in converting circuits to NAND only?

They are cost effective and NAND gates are universal gates. They can also be implemented by using Demorgan's law which will help with cost reduction of circuits.

3 - How does what you did in lab with the breadboard relate to the FPGA?

The breadboard shows us what the FPGA is actually doing so doing this lab gave us more experience with the underlying physical side of circuits.

## Code Submission

Upload a .zip of all your code or a public repository on GitHub.