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

In this lab, we were given a boolean function and were required to implement the function using only NAND gates. This was a good review of boolean algebra, especially DeMorgan's Laws.

Lab Questions

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

$\overline{x.y} = \overline{x} + \overline{y}$

$\overline{x + y} = \overline{x}.\overline{y}$

x	y	x.y	-(x.y)	-x	-y	-x + -y
0	0	0	1	1	1	1
0	1	0	1	1	0	1
1	0	0	1	0	1	1
1	1	1	0	0	0	0

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

NAND is an universal gate and can be used to build any boolean function/circuit. It allows us to use less parts to make a function/circuit.

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

A field programmable gate array and the breadboard in this lab both implement the same boolean function, they just differ in the hardware used. We used only NAND gates, the FPGA uses look up tables. We are also using manual wiring to connect gates, whereas an FPGA's wiring between gates is defined by code.

Code Submission

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