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1/26/17

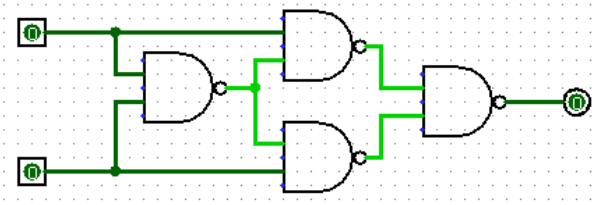
LAB 1 WRITE UP

Title: CS1026 Lab 1 (XOR Gate)

Date: 26/10/2017

Aim: To design an XOR using NAND Gates to implement the function F(a,b) = a'b + a b'.

Logic Diagram:



Analysis:

- I began by examining the truth table for an XOR gate with two inputs and found the variables needed to satisfy which are x'y+xy'
- Using Boolean algebra I expanded this function until I came upon a solution that contained parts which were in the form (ab)'
- I then designed a circuit to implement the Boolean algebra solution on the design software Logisim
- Following this I then tested the circuit using the input variables a and b to see if it was in fact an XOR Gate

Boolean Algebra:

F = a'b + ab'

= a'b +ab' + aa' + bb'

= (a+b)(a'+b') *Simplifying*

=(a+b)(ab)' *DeMorgans*

= a(ab)' + b(ab)'

F' = [a(ab)' + b(ab)']' *Find F'*

= (a(ab)')' . (b(ab)')' *DeMorgans*

F = [(a(ab)')' . (b(ab)')']' *Invert to F*