Digital Logic Design – Lab #1

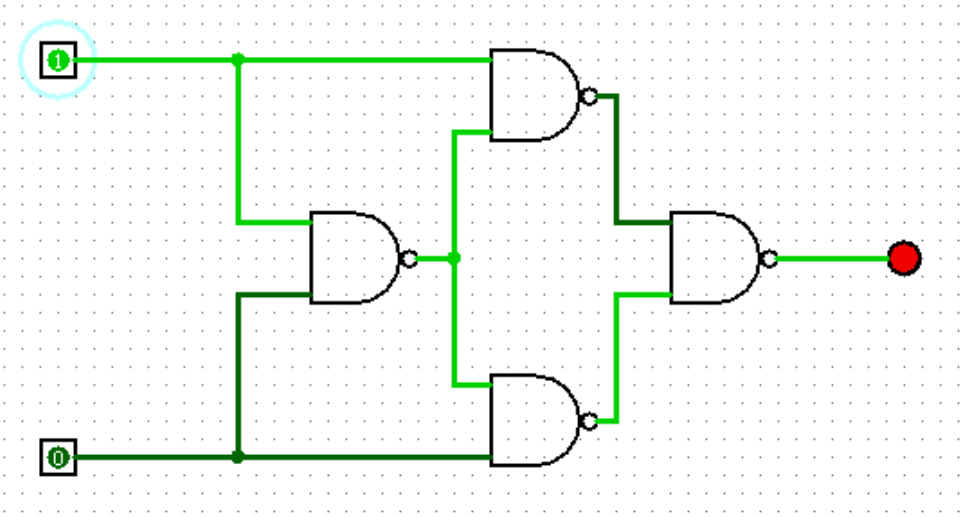
Any logic gate can be constructed from only NAND gates. To construct an XOR gate I first made two truth tables, one for a NAND gate and one for an XOR gate. I then did the Boolean algebra and took a simplified expression for an XOR gate and turned it into one which uses NAND's.

NAND Gate

Input 1	Input 2	Output
0	0	1
0	1	1
1	0	1
1	1	0

XOR Gate

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0



Boolean algebra:

A'B + AB' *(Simplified XOR Gate)*
AA'+A'B+AB'+BB'
A(A+B)'+B(A+B)'
A(A'B')+B(A'B')
A'(A'B')+B'(A'B')
(A(A'B'))'(B(A'B')) *(XOR Gate with NAND gates)*