Exercise Assignment 12

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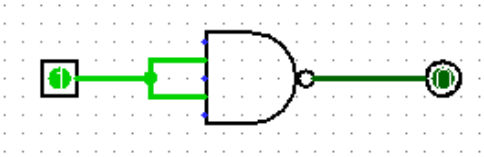
Exercise Assignment 12

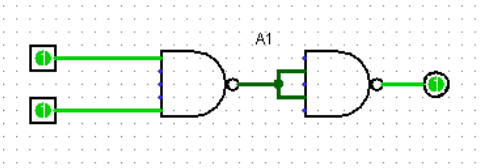
1. You are stranded on a desert island and you only have NAND gates. Construct the following using only NAND gates. For each of the following show the logic circuit with only NAND gates and the truth table. (Six Points)

Create a NOT gate.



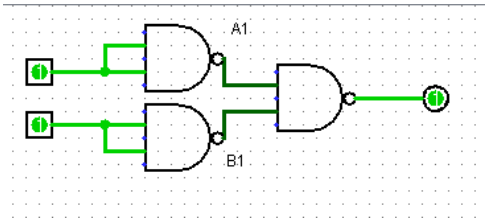
Input	Output
0	1
1	0

Create an AND gate.



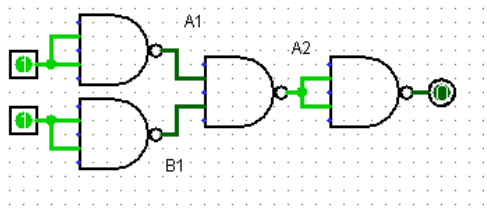
Input			Output
A_0	B_0	A_1	
0	0	1	0
0	1	1	0
1	0	1	0
1	1	0	1

Create an OR gate.



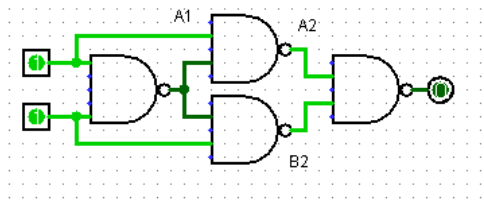
Input				Output
A_0	B_0	A_1	B_1	
0	0	1	1	0
0	1	1	0	1
1	0	0	1	1
1	1	0	0	1

Create a NOR gate.



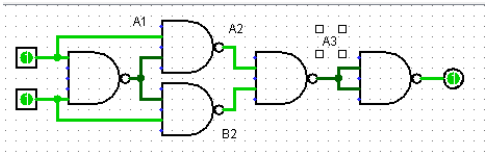
Input					Output
A_0	B_0	A_1	B_1	A_2	
0	0	1	1	0	1
0	1	1	0	1	0
1	0	0	1	1	0
1	1	0	0	1	0

Create and XOR gate.



Input					Output
A_0	B_0	A_1	A_2	B_2	
0	0	1	1	1	0
0	1	1	1	0	1
1	0	1	0	1	1
1	1	0	1	1	0

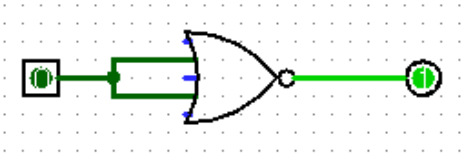
Inverting the output of an XOR gate creates an XNOR gate. Create an XNOR gate.



Input						Output
A_0	B_0	A_1	A_2	B_2	A_3	
0	0	1	1	1	0	1
0	1	1	1	0	1	0
1	0	1	0	1	1	0
1	1	0	1	1	0	1

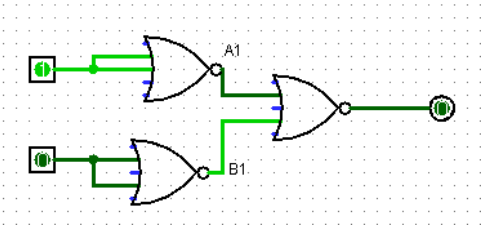
2. You are stranded on a desert island and you only have NOR gates. Construct the following using only NOR gates. For each of the following, show the logic circuit with only NOR gates and the truth table. (Six Points)

Create a NOT gate.



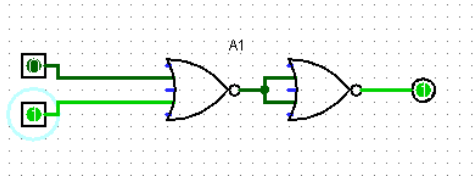
Input	Output
0	1
1	0

Create an AND gate.



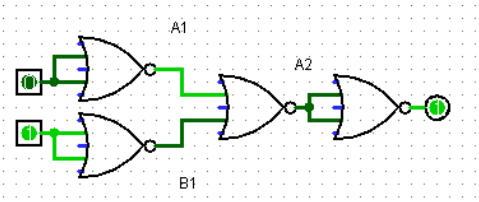
Input				Output
A_0	B_0	A_1	B_1	
0	0	1	1	0
0	1	1	0	0
1	0	0	1	0
1	1	0	0	1

Create an OR gate.



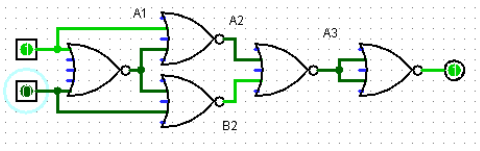
Input			Output
A_0	B_0	A_1	
0	0	1	0
0	1	0	1
1	0	0	1
1	1	0	1

Create a NAND gate.



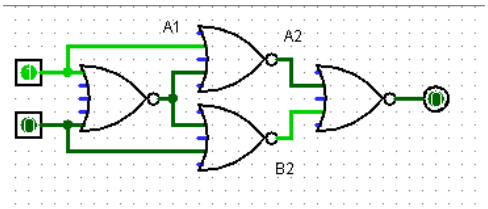
Input					Output
A_0	B_0	A_1	B_1	A_2	
0	0	1	1	0	1
0	1	1	0	0	1
1	0	0	1	0	1
1	1	0	0	1	0

Create and XOR gate.



Input						Output
A_0	B_0	A_1	A_2	B_2	A_3	
0	0	1	0	0	1	0
0	1	0	1	0	0	1
1	0	0	0	1	0	1
1	1	0	0	0	1	0

Inverting the output of an XOR gate creates an XNOR gate. Create an XNOR gate.



Input					Output
A_0	B_0	A_1	A_2	B_2	
0	0	1	0	0	1
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

References

Warford, J. (2009). *Computer systems* (4th ed.). Jones and Bartlett.