

Tutorial 2: Simplification of Boolean Equations

1. Simplify the following expressions:

a. $((A \cdot B)') + B' \cdot B$

b. $A + ((A \cdot B)') \cdot C$

c. $A + ((B + C)') \cdot A$

2. Draw circuits of your simplified expressions. Each circuit will have one output. The result of the boolean equation.

3. You are to design a circuit that has three inputs A B C, and one output R. The output R should be 1 if exactly one or exactly two of the inputs are 1. Fill up the following truth table for the circuit, then write down the canonical form of the boolean equation using a sum of minterms. Simplify the resulting expression as far as you can.

A	B	C	R
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

4. Write down the equation for the circuit using maxterms. Verify that the result is the same as your solution to Q3. (You can do this with a truth table or by arguments based on cases, but can you find a proof in Boolean Algebra?)