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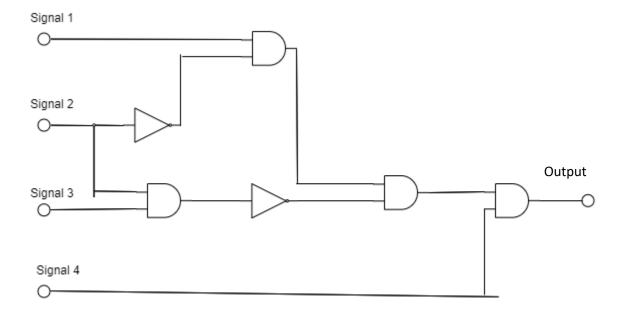
ECE 401

17 November 2020

Homework 9

Objective: Create a logic block that has four inputs and one output value. Provide the gate level circuit diagram, the truth table, and an explanation as to how the circuit works.

Gate Level Circuit Diagram:



Truth Table:

Signal 1	Signal 2	Signal 3	Signal 4	Output
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Explanation:

The output that this four-input logic block creates is $A\overline{B}D(\overline{B}+\overline{C})$. Where A is Signal 1, B is Signal 2, C is Signal 3, and D is Signal 4. If it is satisfied that A and D are 1 and B is 0, it does not matter the quantity of C. Following the logic circuit, the value of C and B will be inverted, so it must be 0, so it can become one and join with A as 1 to form 1. Thus, in the conclusion the "and" gate can pair with the D, which is also a 1, providing a final output of one. This is also an output of $A\overline{B}D(\overline{B}+\overline{C})$.