

Lab 04: Combinatorial Logic Circuits

A. Why?

Combinatorial logic circuits are used in computers to implement arithmetic and logical functions

B. Outcomes

After this lab, you should be able to

- Convert between truth tables, boolean functions, and gate-level circuit diagrams.

C. Questions

1. Write three boolean functions that define $B1 = \text{some expression involving } A1, A2, A3$ and $B2 = \text{some other expression involving } A1, A2, A3$. ($B3$ is easy: $B3 = A3$.)

A1	A2	A3	B1	B2	B3
0	0	0	0	0	0
0	0	1	1	1	1
0	1	0	1	1	0
0	1	1	1	0	1
1	0	0	1	0	0
1	0	1	0	1	1
1	1	0	0	1	0
1	1	1	0	0	1

2. If you read the truth table in Question 1 as taking a 3-bit number A to a 3-bit number B, what function does the table define?
3. Draw a gate-level circuit diagram for the truth table in Question 1, using your functions for B1, B2, and B3.
4. Write out a truth table for the gate-level circuit below. Also, can you find a short English description of what the circuit does?

