Lab 8: 3 Full Adders, 2's Complement
EECE 2106.05

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Abstract

In Experiment 7 we tested and designed a half adder circuit, and a full adder circuit. This experiment continues the full adder theme, we basically had to construct three full adders for this lab and show sum1, sum2, sum3, and carry. AND, XOR, OR gates were used. One highlight was the inclusion of four LED per breadboard, not just our usual one. Our group constructed partially working circuits. Our goal was to construct functioning, correct circuits.

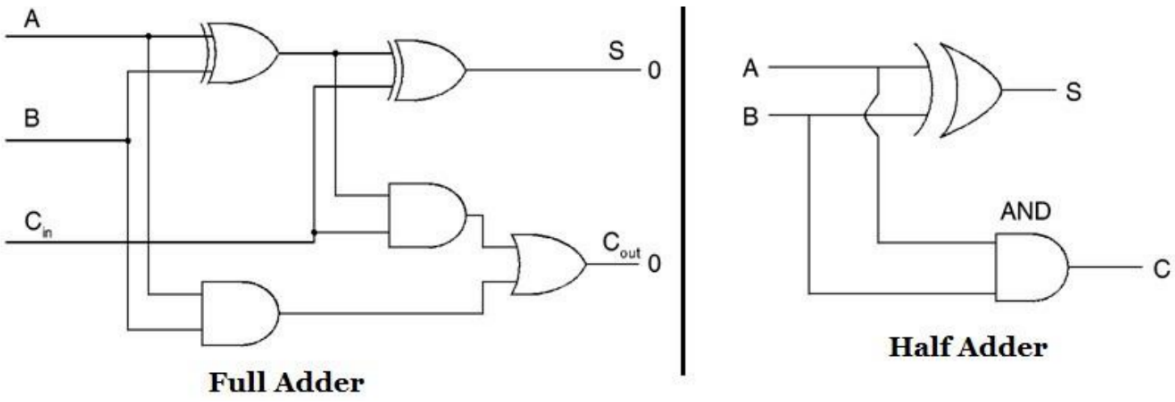
Components:

The components utilized to complete the experiment include:

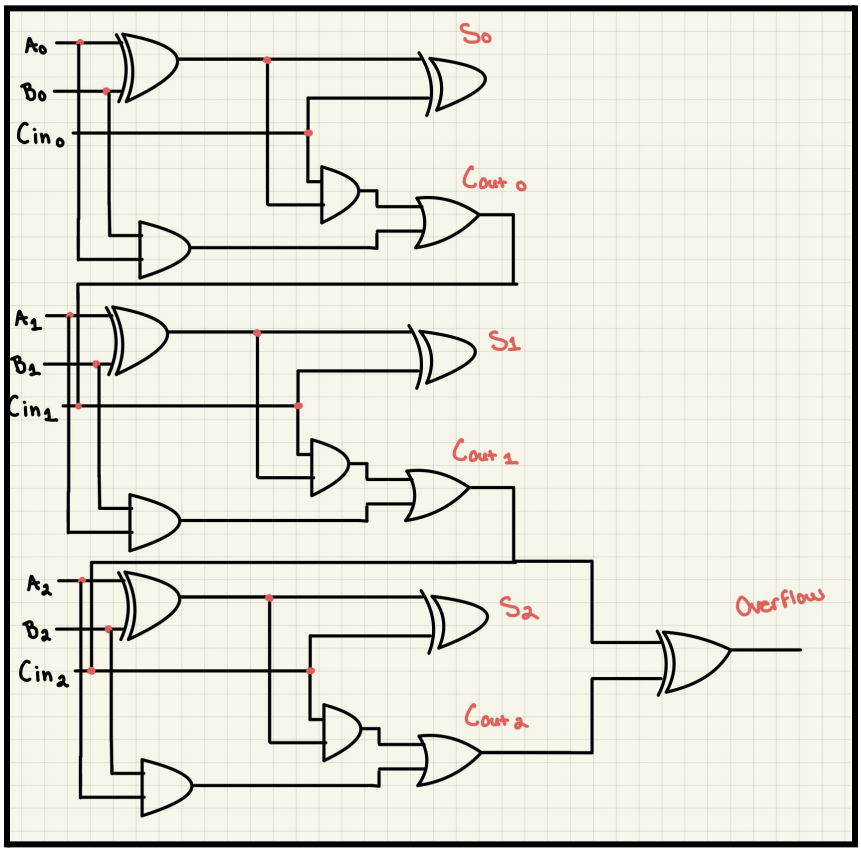
- Gate 7408 (AND gate)
- Gate 7432 (OR gate)
- Gate 7486 (XOR gate)
- 4 resistors
- 4 LED lights
- Two Breadboards (we both tried construction)
    - Cable wires
- Power supply (w/ 5v battery)
    - Multimeter

Experiment:

Here is the circuit diagram given in lab 7:



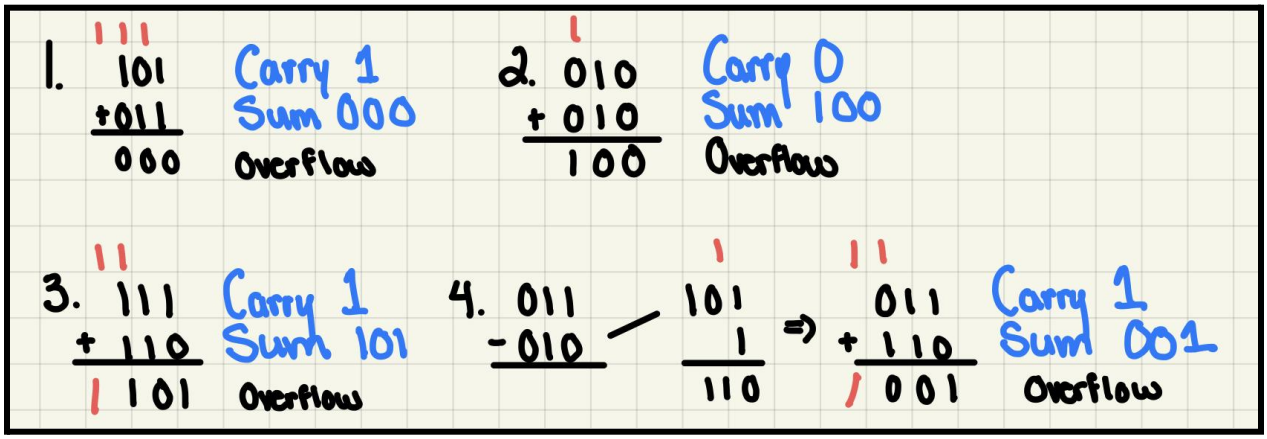
Here is the circuit diagram that we constructed for lab 8:



We figured out that S, C and Cout are LED lights that turn on when input is 1, and off when input is 0.

No truth tables were necessary, instead we had to solve these four equations and figure out sum and overflow:

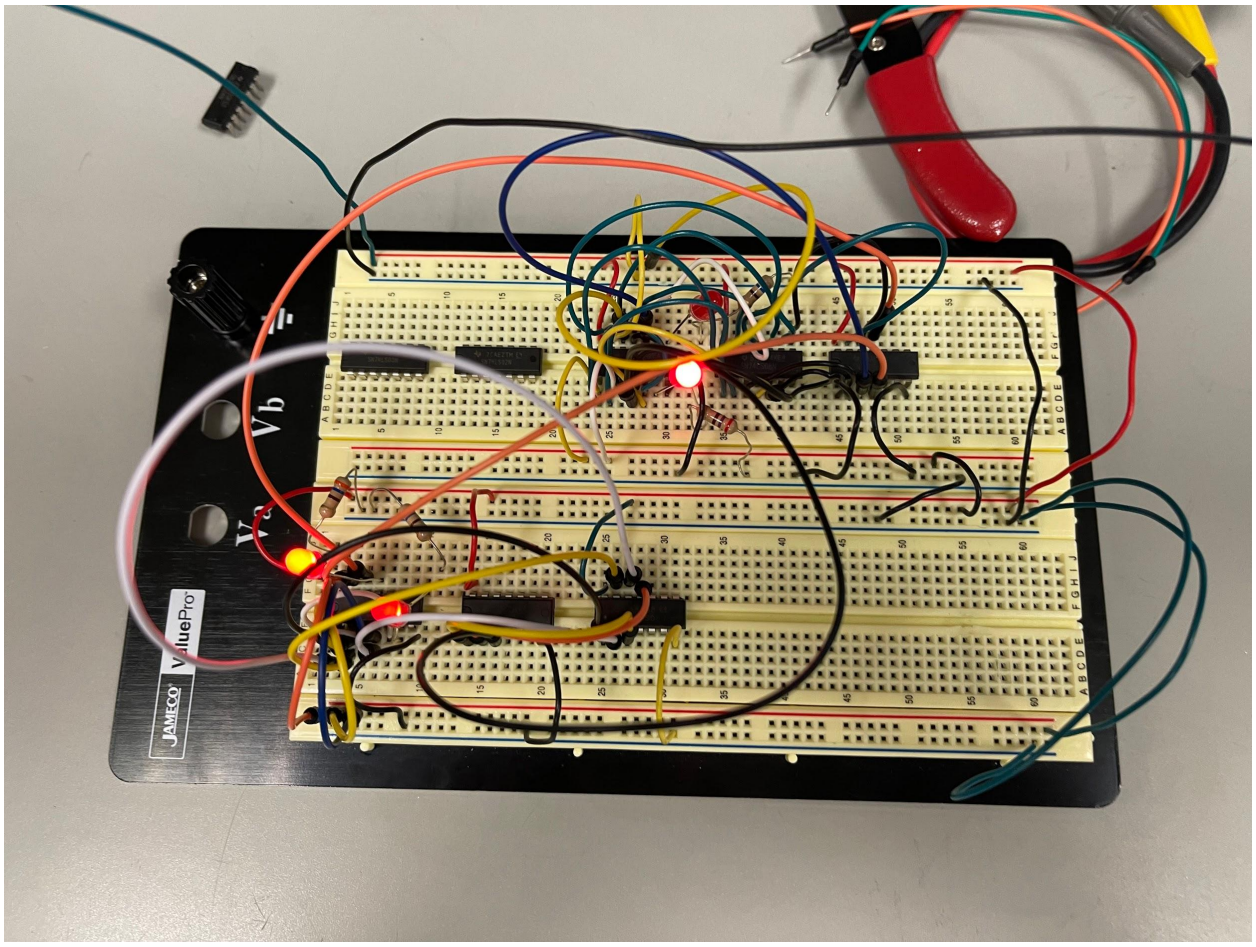
101	010	111	011
+ 011	+ 010	+ 110	- 010



So the result for the first problem is 1000, where the first digit is overflow. The result for the second problem is 100, no overflow. The result for the third problem is 1101, with overflow in the first digit. The fourth result for the fourth problem is 1001, where the first digit is overflow.

Partially working triple adder construction (Samuel)

Only the equations 111 + 110 and 011 - 010 (third and fourth) worked on this breadboard. Faulty circuits are the prime suspect according to feedback from the professor during class.



Conclusion:

Both teammates attempted construction of the circuit. Carlos was responsible for the prelab, Samuel wrote the majority of this lab report. Not all expressions worked and partial credit was given for the lab. Broken circuits continued to be an issue this week, and we need the lab assistant to issue new, unbroken circuits.