

Lab 06 - Ones and Twos Complement

In this lab, you've learned about how computers store and process numbers, specifically negative numbers. In addition, you have learned how to implement a full signed integer system with the Two's Complement number representation.

Rubric

Item	Description	Value
Summary Answers	Your writings about what you learned in this lab.	25%
Question 1	Your answers to the question	25%
Question 2	Your answers to the question	25%
Question 3	Your answers to the question	25%

Lab Summary

Summarize your learnings from the lab here.

In this lab we implemented half adders and half subtractors to create a full signed integer system with two's complements. We learned how computers are able to store and process binary information. By adding numbers with two's complements, we learned the basic foundations of how computers process information.

Lab Questions

1 - Explain the differences between our Half Adder from last lab and the Half Subtractor from this lab.

The primary differences between the half adder and the half subtractor is that the half adder generates a sum and carry, while the half subtractor generates a difference and a borrow.

2 - What about the end around carry of One's Complement makes it hard to use and implement?

Overflow in the end around carry of one's complement makes it harder to implement in the way which instead of being ignored, must be added back to the least significant bit which requires extra logic and an additional logical operation. This can increase propagation delay.

3 - What is the edge case and problem with Two's Complement number representation?

The two's complement scale is asymmetrical and has an extra negative number (-128) as opposed to the positive 127. This is because there is no positive number for the most negative number which leads to overflow.

Code Submission

Upload a .zip of all your code or a public repository on GitHub.