# CprE 381 – Computer Organization and

# Assembly-Level Programming

# Lab-02 Report

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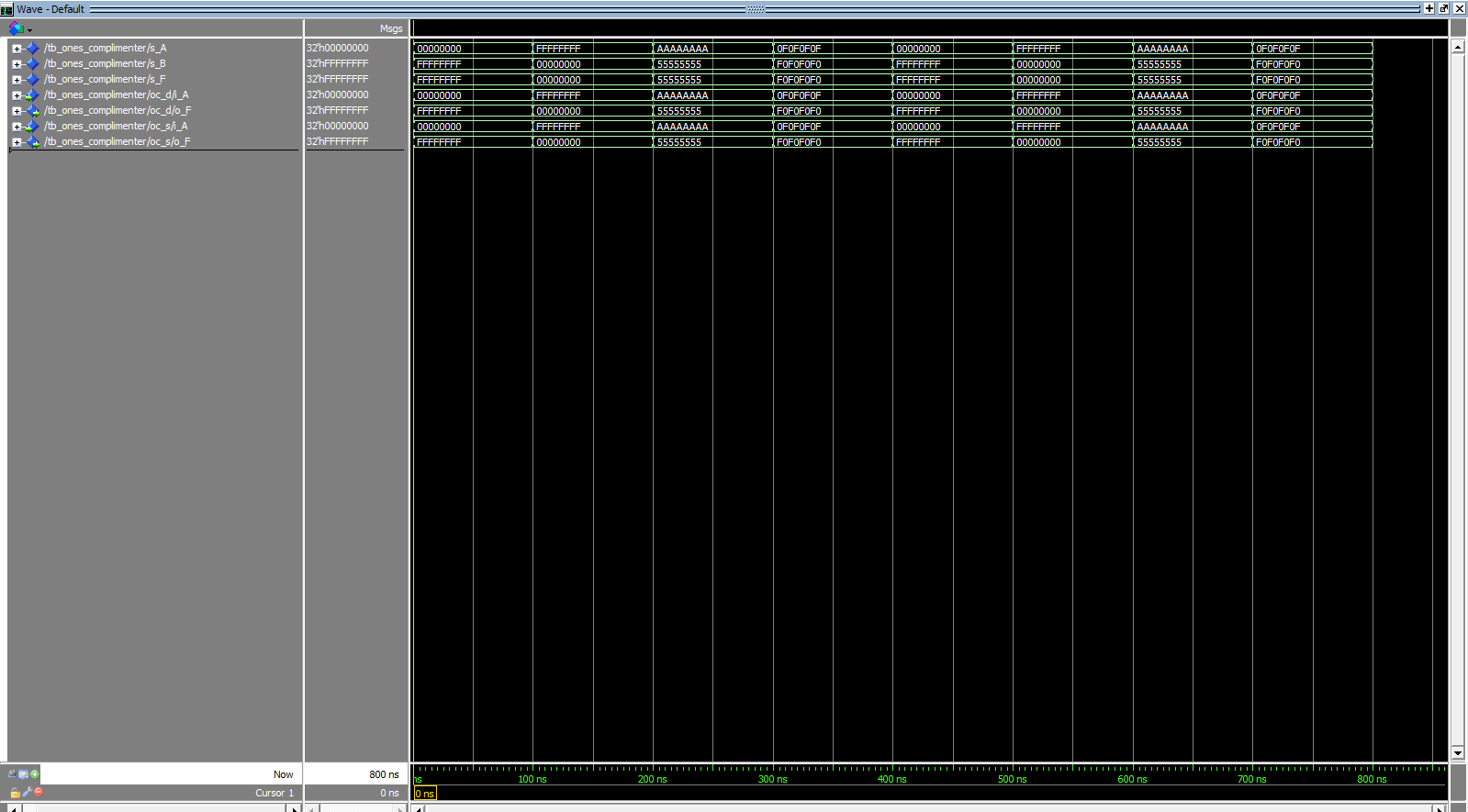
## Section / Lab Time \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Submit a typeset pdf version of this on Canvas by the due date (i.e., the start of your next lab section). Refer to the highlighted language in the Lab-02 instructions for the context of the following questions****.*

1. [Prelab] At the end of Chapter 3, answer questions 4b), 5a), and 6.

See /Prelab2.pdf

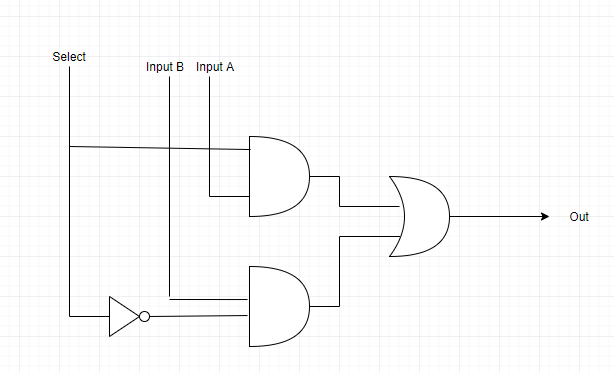
1. [Part 1 (c)] Waveform.



1. [Part 2 (a)] Draw the truth table, Boolean equation, and Boolean circuit equivalent (using only two-input gates) that implements a 2:1 mux.

|  |  |  |  |
| --- | --- | --- | --- |
| In A (A) | In B (B) | Select (S) | Out (O) |
| X | X | 0 | In A |
| X | X | 1 | In B |

Boolean Equation:



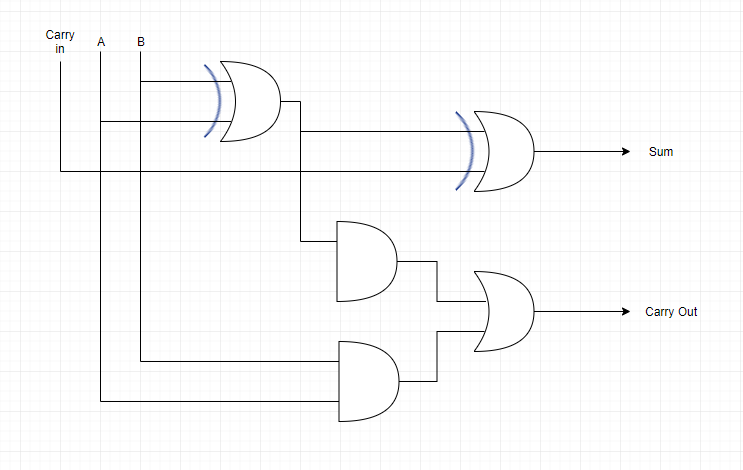
1. [Part 2 (e)] Waveform.



1. [Part 3 (a)] Draw the truth table, Boolean equation, and Boolean circuit equivalent (using only two-input gates) that implements a full adder.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Input A (A) | Input B (B) | Carry in (Cin) | Sum (S) | Carry out (Cout) |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |

Boolean expression: in



1. [Part 3 (e)] Waveform.
2. [Part 4 (a)] Draw a schematic (don’t use a schematic capture tool) showing how an N-bit adder/subtractor with control can be implemented using only the three main components designed in problems 1), 2), and 3) (the N-bit inverter, N-bit 2:1 mux, and N-bit adder). How is the ‘nAdd\_Sub’ bit used?
3. [Part 4 (c)] Provide multiple waveform screenshots in your write-up to confirm that this component is working correctly. What test-cases did you include and why?
4. [Feedback] You must complete this section for your lab to be graded. Write down the first response you think of; I expect it to take roughly 5 minutes (do not take more than 10 minutes).
   1. How many hours did you spend on this lab?

|  |  |  |
| --- | --- | --- |
| **Task** | **During lab time** | **Outside of lab time** |
| Reading lab | 15 minutes | 0 minutes |
| Pencil/paper design | 20 minutes | 45 minutes |
| VHDL design | 35 minutes | 3 hr |
| Assembly coding | 0 minutes | 0 minutes |
| Simulation | 30 minutes | 1 hr |
| Debugging | 30 minutes | 2 hr |
| Report writing | 0 minutes | 1 hr |
| Other: |  |  |
| Total | 2 hr |  |

* 1. If you could change one thing about the lab experience, what would it be? Why?
  2. What was the most interesting part of the lab?