CprE 381, Computer Organization and Assembly-Level Programming, Spring 2019

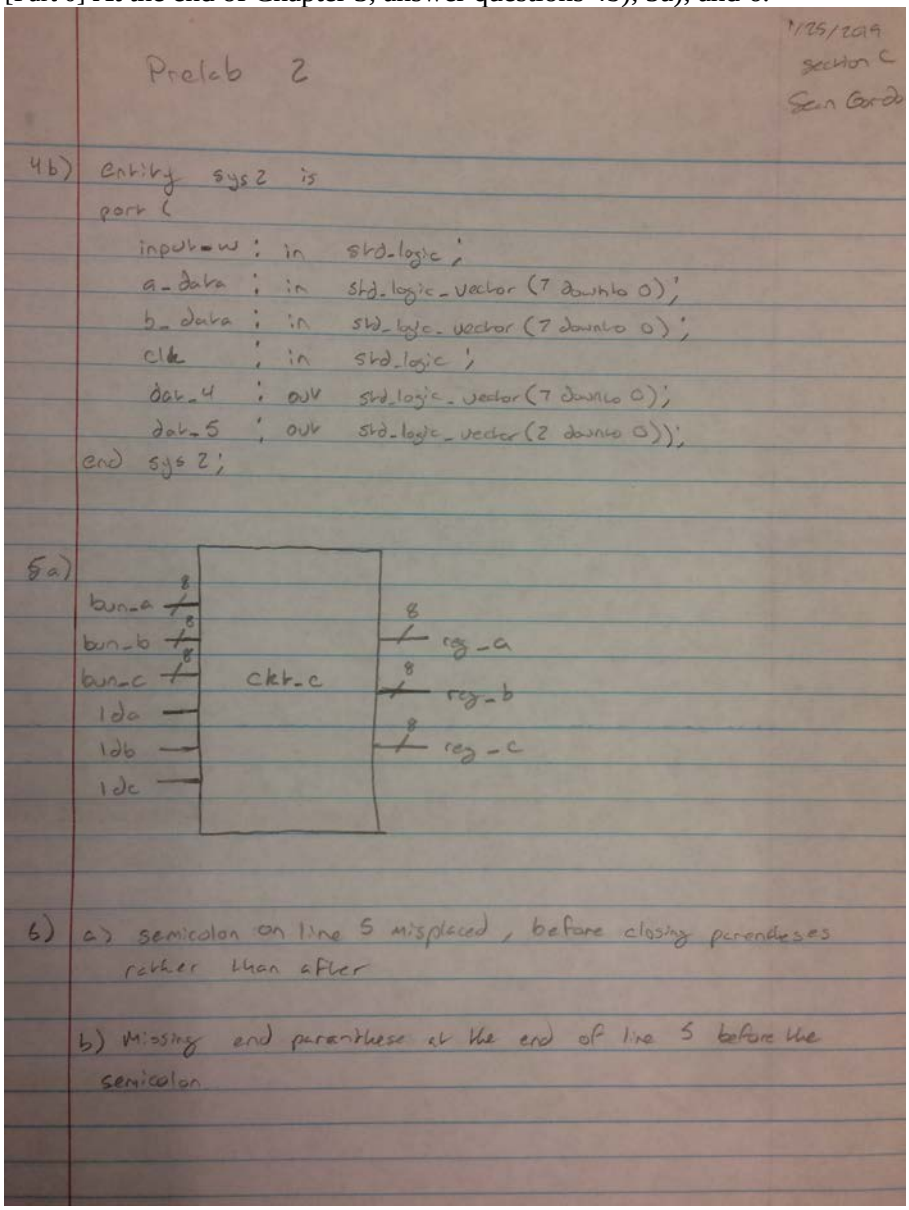
Lab 2 Report

Student Name _____Sean Gordon_____

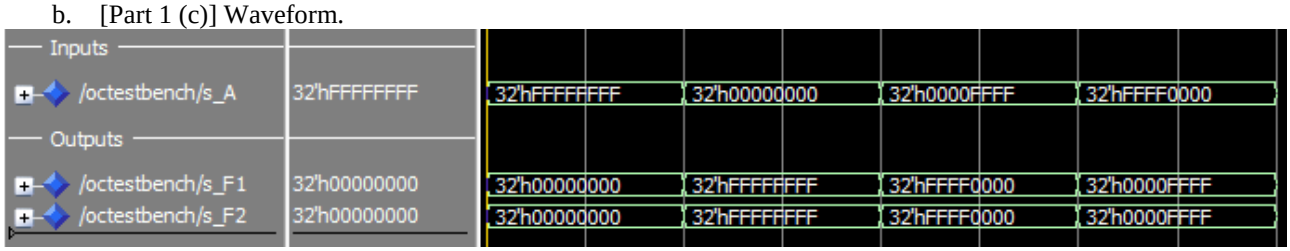
Section/Lab Time _____C/10:00 a.m._____

Refer to the highlighted language in the lab 2 instruction for the context of the following questions.

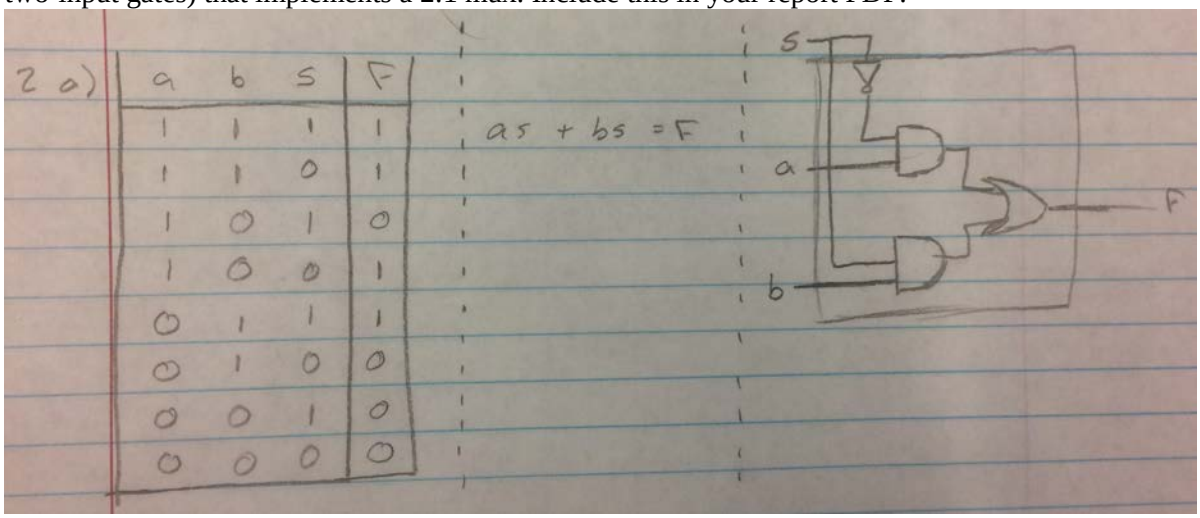
a. [Part 0] At the end of Chapter 3, answer questions 4b), 5a), and 6.



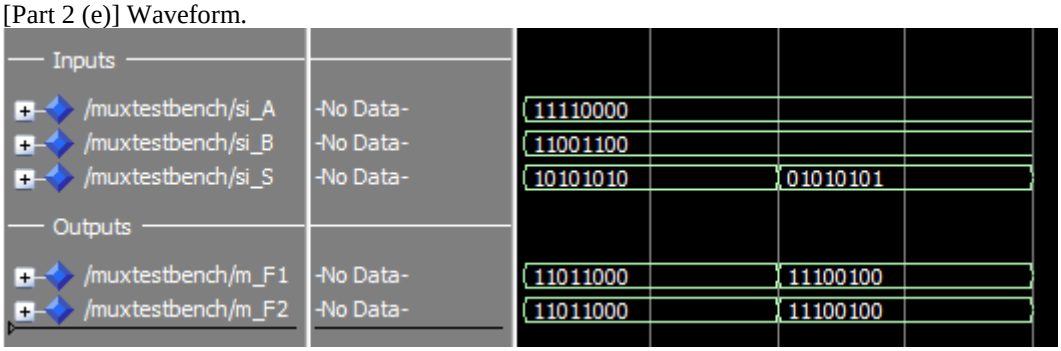
b. [Part 1 (c)] Waveform.



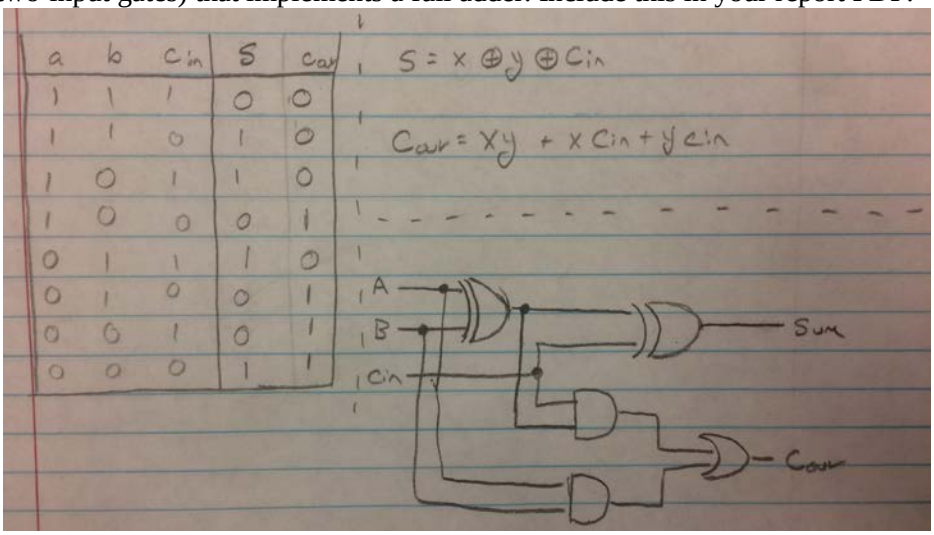
c. [Part 2 (a)] Draw the truth table, Boolean equation, and Boolean circuit equivalent (using only two-input gates) that implements a 2:1 mux. Include this in your report PDF.



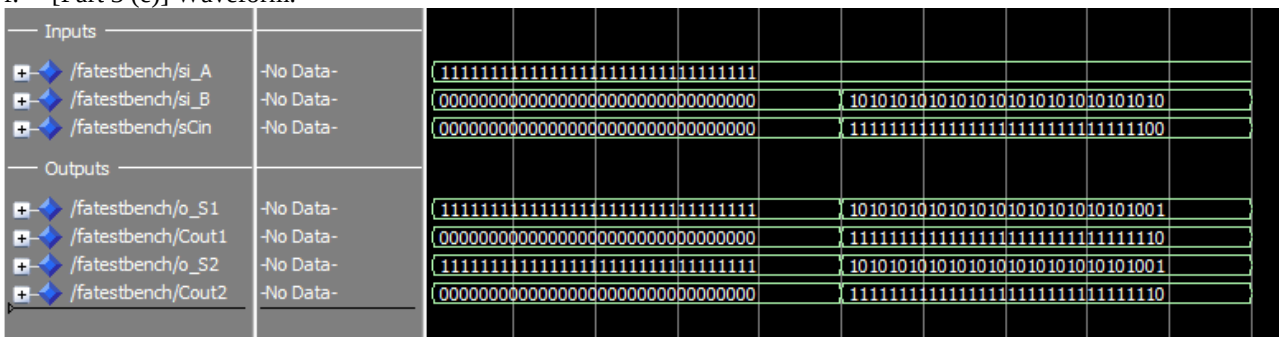
d. [Part 2 (e)] Waveform.



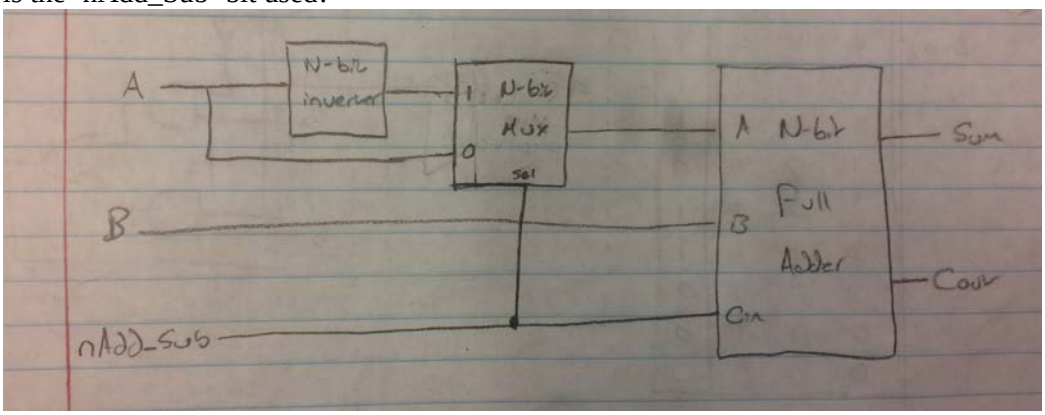
e. [Part 3 (a)] Draw the truth table, Boolean equation, and Boolean circuit equivalent (using only two-input gates) that implements a full adder. Include this in your report PDF.



f. [Part 3 (e)] Waveform.

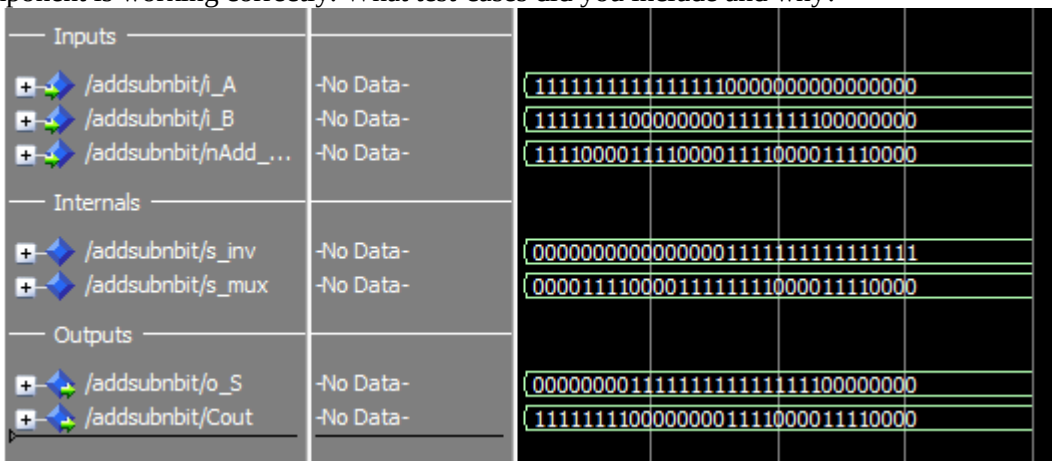


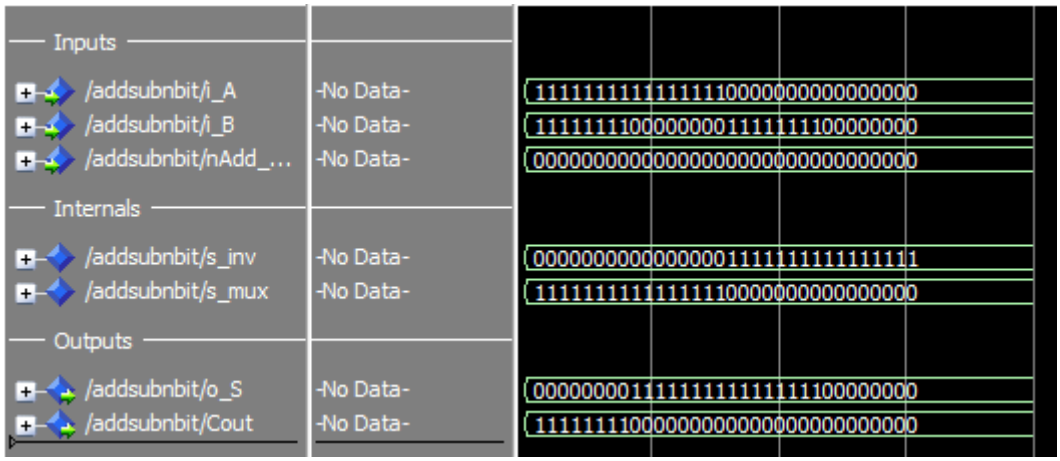
g. [Part 4 (a)] Draw a schematic (don't use a schematic capture tool) showing how an N-bit adder/subtractor with control can be implemented using only the three main components designed in problems 1), 2), and 3) (the N-bit inverter, N-bit 2:1 mux, and N-bit adder). How is the 'nAdd_Sub' bit used?

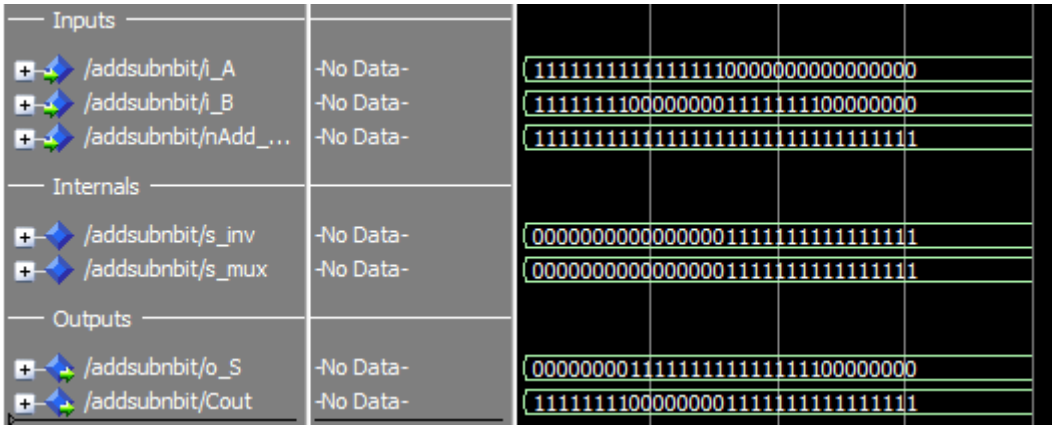


The nAdd_Sub bit is used to decide between adding and subtracting, using twos complement to achieve the latter. It is fed into the multiplexor as a select bit and into the full adder as a carry in.

h. [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?







I included a case alternating the nAdd_Sub bit, one where the bit is all 0, and one where it is all 1. I felt this was an apt enough test of the performance.

i. [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).

a. How many hours did you spend on this lab?

Task	During lab time	Outside of lab time
Reading lab	30 min	10 min
Pencil/paper design	0 min	10 min
VHDL design	60 min	30 min
Assembly coding	0 min	0 min
Simulation	10 min	20 min
Debugging	20 min	70 min
Report writing	0 min	20 min
Other:		
Total	120 min	160 min

b. If you could change one thing about the lab experience, what would it be? Why?
That you have to write about your experience at the end. I have much more important things to do, and unless this class is one in a million, the metrics I list here will be disregarded in two or three years' time.

c. What was the most interesting part of the lab?
Going home